ARCADIS

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Our Ref: B0035101 (30059709)

Date: December 6, 2021
Subject: Preliminary (30%) Remedial Design Report
Lower Ley Creek Subsite of the Onondaga Lake Superfund Site
Syracuse, New York

Dear Ms. Sacks,

On behalf of the Respondents to the Administrative Order on Consent (AOC) for Remedial Design, Arcadis of New York, Inc. is submitting this Preliminary (30%) Remedial Design Report associated with the Lower Ley Creek Subsite of the Onondaga Lake Superfund Site pursuant to the United States Environmental Protection Agency (USEPA) Record of Decision dated September 2016.

Please let us know if you have any questions or comments.

Sincerely,
Arcadis of New York, Inc.

Lauren Putnam for

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Project Coordinator

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Enclosure

ARCADIS

Respondents to Administrative Order
on Consent for Remedial Design

Preliminary (30%) Remedial Design Report

Lower Ley Creek Subsite,
Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina
Onondaga County, New York

Superfund Site ID: NYD986913580

December 2021

Preliminary (30%) Remedial Design Report

Lower Ley Creek Subsite
Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina
Onondaga County, New York

December 2021

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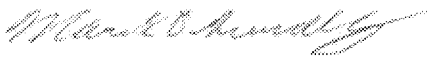

12/6/2021
Mark O. Gravelding, P.E. Date
Project Coordinator

12/6/2021
Lauren Putnam Date
Project Manager

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Acronyms and Abbreviations

AOC	Administrative Order on Consent
Arcadis	Arcadis of New York, Inc.
BMP	Baseline Monitoring Plan
BOL	bill of lading
CFR	Code of Federal Regulations
cfs	cubic feet per second
COC	constituent of concern
CRS	Cultural Resources Survey
DOT	United States Department of Transportation
Final RD	Final (100%) Remedial Design Report
FIS	Flood Insurance Study
fps	feet per second
FS	Feasibility Study
GM-IFG	General Motors – Inland Fisher Guide
GM-IFG OU2	Operable Unit 2 of the General Motors – Inland Fisher Guide Operable Unit of the Onondaga Lake Superfund Site
HASP	Health and Safety Plan
H:V	horizontal:vertical
ICIAP	Institutional Controls Implementation and Assurance Plan
Intermediate RD	Intermediate (60%) Remedial Design Report
LDF	local disposal facility
mg/kg	milligram per kilogram
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
OLCC	Old Ley Creek Channel
OU	Operable Unit
PCB	polychlorinated biphenyl
PDI	Pre-Design Investigation
PDI WP	Pre-Design Investigation Work Plan

PM_{10}	airborne particulates 10 microns in diameter or smaller
POP	Project Operation Plan
Pre-Final RD	Pre-Final (95%) Remedial Design Report
Preliminary RD	Preliminary (30%) Remedial Design Report
PRSP	Periodic Review Support Plan
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD SOW	Remedial Design Statement of Work
RDWP	Remediation Design Work Plan
RA Respondents	Respondents to the Administrative Order on Consent for Remedial Action
RD Respondents	Respondents to the Administrative Order on Consent for Remedial Design
RI	Remediation Investigation
ROD	Record of Decision
SCO	Soil Cleanup Objective
SMP	Site Management Plan
Subsite	Lower Ley Creek Subsite – Operable Unit 25 of the Onondaga Lake Superfund Site in Onondaga County, New York
TBD	to be determined
TCLP	toxicity characteristic leaching procedure
TDP	Transportation and Non-Local Disposal Plan
TSCA	Toxic Substances Control Act
TWTS	temporary water treatment system
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	volatile organic compound

1 Introduction

This Preliminary (30%) Remedial Design Report (Preliminary RD) describes the conceptual framework of the remedial design (RD) for the Lower Ley Creek Subsite (Subsite), which is Operable Unit (OU) 25 of the Onondaga Lake Superfund Site. The Subsite (Superfund Site Identification Number: NYD986913580) is located in Onondaga County, New York within the City of Syracuse, and the Town of Salina (Figure 1-1). Arcadis of New York, Inc. (Arcadis) prepared this Preliminary RD on behalf of the Respondents to the Administrative Order on Consent (AOC) for Remedial Design (the RD Respondents), Comprehensive Environmental Response, Compensation, and Liability Act 02-2016-2014, pursuant to the United States Environmental Protection Agency (USEPA) Record of Decision (ROD; USEPA 2014).

This Preliminary RD has been prepared in accordance with the September 3, 2021 Remedial Design Work Plan (RDWP), which was approved by USEPA on September 7, 2021. This Preliminary RD includes the technical parameters upon which the design is based, including the relevant components of a Design Criteria Report (e.g., project description, design requirements and provisions), as specified in the Remedial Design/Remedial Action Handbook (USEPA 1995).

The representations, maps, dates, site history, or any other information contained in this Preliminary RD are being made with full reservation of the participating RD Respondents' rights, and do not constitute an admission of liability by any party or admission as to the accuracy of any representations, maps, dates, site history, or any other information contained in this Preliminary RD.

1.1 Site Background

It is understood that on or about 1952, General Motors commenced manufacturing operations at a facility located adjacent to Ley Creek upstream of the Lower Ley Creek Subsite. Discharges of polychlorinated biphenyl (PCB)-containing oil were documented from the General Motors – Inland Fisher Guide (GM-IFG) facility to Ley Creek. Post-1984 sampling detected PCBs in creek sediments from the location of the GM-IFG facility downstream to the mouth of the Creek at Onondaga Lake. From approximately 1970 through 1973, an Onondaga County flood control project deepened, widened, and relocated portions of Ley Creek within the boundary of what is defined as the Lower Ley Creek Subsite and spoils from this project were placed along portions of the banks of the creek within the boundary of what is defined as the Lower Ley Creek Subsite. Additional summary of the history of the Subsite was provided in Section 2.2 of the Pre-Design Investigation (PDI) Work Plan (PDI WP; Arcadis 2016).

The remainder of this section provides a description of the Subsite and a summary of investigations previously performed at the Subsite.

1.1.1 Subsite Description

The Subsite was listed on the National Priorities List on December 16, 1994. The Subsite is located within an urbanized area of eastern Syracuse, New York (Figure 1-2) and consists of the lower 2 miles of Ley Creek between the U.S. Route 11 Bridge and Onondaga Lake. The Subsite also includes a 3.7-acre wetland situated on the southern bank of the creek adjacent to the closed Cooper Crouse-Hinds North Landfill; and the Old Ley Creek Channel (OLCC), which was an original section of the Creek before Ley Creek was widened and reconfigured

during a flood control project in the 1970s. In addition, the Subsite includes several sections along the banks of the creek where spoils were placed during the flood control project.

The Subsite is located within an area zoned as an Industrial District. It is bordered by parking lots, the closed Town of Salina Landfill (previously remediated), and the closed Cooper Crouse-Hinds North and South Landfills (previously remediated), other historically landfilled areas, manufacturing operations, several undeveloped properties, and a railroad line. The footprints of the former landfills are illustrated on Figure 1-2 and shown in context on Figures 1-3a through 1-3j. An underground natural gas pipeline owned by National Grid and an underground oil pipeline owned by Buckeye Pipeline Company run parallel to the northern bank of the creek for much of the section bordered by the former City of Syracuse Landfill Area and the Crouse Hinds Landfills (Figure 1-2).

Ley Creek passes under bridges along U.S. Route 11, 7th North Street, and Interstate 81. Bear Trap Creek enters Ley Creek upstream of 7th North Street. The Ley Creek channel is well defined, and the banks of Ley Creek are near vertical in many areas. The bottom of the stream is dominated by soft sediment with some areas of stone or other hard surfaces. Much of the stream is shallow, but water may be as deep as 14 feet in certain sections during high water events, particularly downstream of the 7th North Street Bridge. In general, Ley Creek is narrower and shallower upstream of the 7th North Street Bridge, and wider and deeper downstream of the 7th North Street Bridge. The immediate banks of the stream are bordered predominantly by herbaceous vegetation. Some woody shrubs are also mixed with herbaceous vegetation, and sections of the bank are wooded. Beyond the narrow strip of vegetation, Ley Creek is surrounded by industrial operations, parking lots, remediated and historical landfills, and railroad tracks; the creek transverses the northern Syracuse metro area, a heavily urbanized environment.

Two drainage swales of interest are within or adjacent to the Subsite: a former "swale area" in the upstream portion of the Subsite near the OLCC and the former City of Syracuse Landfill Area; and the "Western Drainage Swale," which is a small north/south drainage ditch located north of Ley Creek and due west of the closed Town of Salina Landfill (see Figure 1-2). The former "swale area" located near the OLCC was investigated in 2010 to a depth of 5 feet, and results indicate PCB concentrations as high as 500 milligrams per kilogram (mg/kg) in this area (USEPA 2014). In 2010, excavation was performed by the Town of Salina within the Western Drainage Swale as part of remediation activities associated with the closed Town of Salina Landfill (Clough, Harbour & Associates LLP 2013). The closed Town of Salina Landfill is also a subsite of the Onondaga Lake Superfund Site (OU 8).

1.1.2 Previous Investigations

Investigative fieldwork for the Remedial Investigation (RI)/Feasibility Study (FS) at the Subsite began in November 2009 at the direction of the New York State Department of Environmental Conservation (NYSDEC). Sediment, soil, groundwater, and surface water samples were collected and analyzed. In addition, fish samples were collected as part of the human health and ecological risk assessments.

USEPA conducted field investigations at the Subsite from 2009 through 2011, which culminated in the completion of RI and FS reports in 2013 and 2014, respectively. As documented in the PDI WP, which was conditionally approved by USEPA in a letter dated February 2, 2017, the following data for the Subsite have been adopted for use moving forward:

- Soil and sediment data collected by USEPA in 2009, 2010, and 2011
- Soil and sediment data collected by NYSDEC in 2010.

Results of the RI sampling activities are presented in the Final RI Report (Los Alamos Technical Associates, Inc. 2013) and the ROD, and additional information on previous sampling activities can be found in the Final FS Report (HydroGeologic, Inc. 2014).

Since issuance of the ROD, PDI activities were conducted from 2017 to 2019 to refine the vertical and horizontal extent of PCB impacts in areas in and around the ROD-defined removal areas. Primarily, PDI soil and sediment samples were analyzed for PCBs, with select samples also submitted for analysis of metals. A detailed summary of the PDI soil and sediment sampling program and results are presented in the revised PDI Data Summary Report (Arcadis 2020).

Only the data adopted for use moving forward is illustrated on Figures 1-3a through 1-3j, with the exception of location L-7 (Figure 1-3a). As described in the PDI WP (Arcadis 2016) and subsequent documents, data collected from location L-7 by NYSDEC in 1996 were evaluated during the data usability assessment but not carried forward for design purposes due to concerns about temporal relevance and location accuracy. However, location L-7 is illustrated on Figure 1-3a at the request of USEPA.

1.2 Site Characterization

The details of the site characterization are presented in the RDWP (Arcadis 2021) and are summarized in the sections below. The information presented in this section serves to support the basis of design presented in Section 2.

1.2.1 Hydrogeology

Groundwater discharge to surface water channels accounts for most of the stream flow in the Onondaga Lake Basin. Groundwater discharge accounts for an estimated 56 percent of stream flow in Ley Creek. The groundwater can be found from 8 to 12 feet below ground surface in the overburden of the Subsite.

1.2.2 Geotechnical Conditions

In-water and upland geotechnical borings were installed during the PDI program in areas of anticipated excavation/dredging and geotechnical parameter laboratory testing was performed on the samples collected from each boring. The summary of the soil sieve size analytical results show that geotechnical conditions vary throughout the Subsite. In general, Subsite soils consist of coarse to fine sand with fines (e.g., silts and clay). Atterberg Limit analysis results show that soil fines primarily consist of clay. Bedrock was not encountered during geotechnical boring field activities.

1.2.3 Hydrology

Ley Creek flows in a southwesterly direction into Onondaga Lake and is included in the Seneca River Drainage Basin (HUC-8: 04140201). Ley Creek is classified as a 6 New York Codes, Rules and Regulations (NYCRR) § 701.7 New York State Class C stream from the mouth of the Creek to a point approximately 1.3 miles upstream of the mouth. Upstream of this point, Ley Creek is a Class B stream. The best usage of Class C streams is fishing and the water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. The best usage of Class B streams is for primary and secondary contact recreation and fishing. Class B streams are suitable for fish, shellfish, and wildlife propagation and survival.

The nearest United States Geological Survey (USGS) stream gauge station, USGS 04240120 Ley Creek, is located near Park Street in Syracuse, New York, approximately 0.3 mile upstream of the confluence of Onondaga Lake and Ley Creek and downstream from proposed removal areas (USGS 2021a). Stream flow characteristics shown in Table 1-1 below were obtained from the USGS database for the Ley Creek gauge station.

Table 1-1. Ley Creek Stream Flow Characteristics

Period of Record or Date	Flow Characteristics	Discharge (cfs)
1973-2020	Maximum average daily flow	1,110[a]
1973-2020	Minimum average daily flow	1.9[b]
7/1/15	Maximum peak stream flow	1,610
1973-2020	Mean average daily flow	44
1973-2020	Median average daily flow	25

Notes:
[a] Value based on data from 7/1/2015.
[b] Value based on data from 2/6/1977.
cfs = cubic feet per second

The cumulative distribution frequency of the Ley Creek average daily flow recorded at the USGS stream gauge for the period of record (1973 through 2020) is illustrated on Figure 1-4. As illustrated therein, the mean average daily flow of 44 cfs has been exceeded approximately 27 percent of the time.

A preliminary hydraulic model of existing hydraulic conditions during the 100-year flood flows was developed based on topographic and bathymetric transect data, as well as detailed creek crossing data (e.g., bridges, pipelines) collected during the PDI activities. The survey and creek crossing data were used to develop topographic cross sections that were used in Hydrologic Engineering Centers River Analysis System (HEC-RAS) modeling software to compute parameters such as water surface elevation, flow area, depth, velocity, and other characteristics to assess creek flow conditions. The HEC-RAS hydraulic model for this RD includes Ley Creek from approximately 200 feet upstream of the U.S. Route 11 bridge to the confluence of Ley Creek and Onondaga Lake.

Drainage areas, flowrates, and channel roughness coefficients were based on the Federal Emergency Management Agency Flood Insurance Study (FIS) for Onondaga County, New York (all Jurisdictions) effective November 4, 2016. Two flow rates were utilized in modeling the 100-year flood based on the flow change specified in the FIS, which is located at the confluence of Bear Trap Creek and Ley Creek (approximately 1.1 miles upstream of Onondaga Lake). A flowrate of 2,330 cfs was utilized upstream of the confluence of Bear Trap Creek and Ley Creek. A flowrate of 2,850 cfs was utilized from the confluence of Bear Trap Creek and Ley Creek to Onondaga Lake. Both of these flowrates are consistent with the assumptions from the FIS.

Based on the data available from the USGS 04240120 Ley Creek stream gauge, average flow rates, by month, are summarized in Table 1-2 below. Monthly averages are based on actual historical stream flow gauge data from the USGS station for the full years of record for the period 1973 through 2020.

Table 1-2. Monthly Average Flow (1973-2020)

Month	Monthly Average Flow at Gauging Station (cfs)
January	44
February	51
March	74
April	70
May	43
June	33
July	29
August	24
September	29
October	36
November	45
December	54

Note:
1. Values were obtained from the USGS National Water Information System for gauging station 04240120, Ley Creek at Park Street (USGS 2021a). Averages for the months of October, November, and December do not consider values for 2020 since the station was defunded in September 2020.

The approximate maximum average daily flows for specified recurrence intervals were calculated using the USGS StreamStats web service (USGS 2021b) and are provided in Table 1-3 below.

Table 1-3. Maximum Average Daily Flow Recurrence Intervals

Recurrence Interval	Upstream of Confluence of Bear Trap Creek and Ley Creek (cfs)	Downstream of Confluence of Bear Trap Creek and Ley Creek (cfs)
2-Year	471	575
5-Year	603	735
25-Year	782	952
100-Year	2,330	2,850

Note:
1. Values for the 2-year, 5-year, and 25-year recurrence intervals were obtained from USGS online software StreamStats for the locations specified in table. Values presented for the 100-year recurrence interval are based on the FIS. It is believed that StreamStats account for the full data set record (1973 to 2020).

Average daily mean velocity was also evaluated over a 10-year period from 2010 to 2020. This evaluation was based on actual historical daily mean flow data available from the USGS 04240120 Ley Creek stream gauge, which were input into the existing conditions HEC-RAS model to calculate the approximate average daily mean velocity range expected in Ley Creek. Over the 10-year period, average daily mean velocities range from approximately 0.2 to 1.0 feet per second (fps), with average flow depths ranging from approximately 6 inches in several locations to approximately 8 feet near the confluence of Onondaga Lake and Ley Creek.[1]

Average channel velocities, by month, are summarized in Table 1-4 below for the full data set record (1973 through 2020).

Table 1-4. Estimated Monthly Average Velocity

Month	Calculated Average Daily Mean Velocities (fps)
January	0.51
February	0.53
March	0.61
April	0.60
May	0.50
June	0.46
July	0.44
August	0.41
September	0.44
October	0.47
November	0.51
December	0.54

Note:
1. Values based on flow data obtained from the USGS National Water Information System for gauging station 04240120, Ley Creek at Park Street (USGS 2021a). Averages for the months of October, November, and December do not consider values for 2020 since the station was defunded in September 2020.

1.2.4 Wetland Delineation and Habitat Characterization

In accordance with the Remedial Design Statement of Work for the Onondaga Lake Superfund Site, OU 25 – Lower Ley Creek (RD SOW; USEPA 2016), the description of the delineated wetlands and habitats for affected areas of the Subsite is provided in Appendix A, Habitat Restoration Plan.

[1] Based on review of the average daily mean velocities by month (Table 1-4), which is based on average monthly flows available from USGS 04240120 Ley Creek stream gauge for the full data set record (1973 through 2020), it is not expected that running the HEC-RAS model to calculate the daily mean velocity for the full data set would substantially change the range calculated using the most recent 10-year data.

1.2.5 Infrastructure, Topography, and Bathymetry

Topographic and bathymetric surveys were performed during the PDI, including location of utilities in the vicinity of the Subsite. The survey data indicate that within the Subsite the upland areas are relatively flat, and the bed of Ley Creek is well channeled with steep sides. The creek depth ranges from 1 to 14 feet deep, averaging 3 to 5 feet over much of its length. The deepest sections are closer to the lake and the shallowest sections are near the U.S. Route 11 Bridge. The bottom of the stream is primarily composed of soft sediment, with few areas of stone or riffle (rocky shoal).

1.2.6 Cultural Resources

In accordance with the ROD and RDWP, a Cultural Resources Survey (CRS) is being conducted for the Subsite to determine whether significant or potentially significant historic properties (archaeological and architectural resources) are present in the vicinity of the targeted remediation areas and whether potential short-term or long-term impacts may occur to those resources by implementation of the remedial activities.

The Phase IA CRS was initiated in fall 2021 after USEPA approval of the RDWP. The results of the Phase IA will be presented in a Phase IA CRS report, which will include the following:

- Details of the methodologies employed to conduct the Phase IA CRS study
- Results of the study, including a management summary, associated figures, and photographs to illustrate the results, as appropriate
- Conclusions on the potential presence or absence of significant historical properties (archaeological and architectural resources) within the Area of Potential Effect and on potential impacts to them because of remedy implementation
- Conclusions as to any visual impacts that may occur to historic properties because of remedy implementation
- Recommendations for any warranted additional investigations or evaluations
- A complete reference citation section.

If no additional investigations or evaluations of all or portions of the Area of Potential Effect are warranted, such conclusions will be clearly stated in the report. If a Phase IB investigation is determined to be necessary based on the Phase IA CRS results and comments from the appropriate regulatory agencies, a separate work plan will be prepared to outline the Phase IB efforts. Any recommendations regarding a Phase 2 investigation will be made based on the findings of the Phase IB investigation (if a Phase IB CRS is required based on the results of Phase 1A).

A Phase IB CRS will be conducted only if determined to be necessary based on the Phase IA results and concurrence by relevant regulatory agencies. Any recommendations regarding a Phase 2 CRS will be made once the presence of historic properties is firmly established during a Phase IB investigation (if a Phase IB CRS is required based on the results of Phase 1A).

If cultural resources are identified at the Subsite, then consultation with appropriate regulatory agencies will be conducted prior to finalizing the RD. Necessary modifications to the remedy will be incorporated into the RD based on the results of the CRS and agency requirements.

1.2.7 Nature and Extent of Impacts

The sampling results presented in the ROD indicate that PCBs are collocated with the vast majority of the other COCs within the Subsite. Additional PCB data was collected during PDI activities and compared to the ROD-defined removal areas to further refine the removal extents.

Review of these data show that PCB impacts throughout the Subsite are widespread and variable. PCB results obtained during the PDI activities show that PCB concentrations in soil range from non-detect to 580 mg/kg, with a mean and median PCB concentration of 12 mg/kg and 0.75 mg/kg, respectively. PCB concentrations in sediment range from non-detect to 350 mg/kg, with a mean and median PCB concentration of 18 mg/kg and 2.8 mg/kg, respectively. As presented on Figures 1-3a through 1-3j, remedial area boundaries indicate the depth of impacts and concentration of impacts are greater in upstream soils and sediments. The depth of soil impacts throughout the Subsite ranges from 0.5 to 14 feet below ground surface, while the depth of sediment impacts throughout the Subsite ranges from 1 to 10 feet below sediment surface.

1.3 Description of the Selected Remedy

The selected remedy for the Subsite, as presented in the 2014 USEPA ROD, includes the following components:

- Excavate PCB-contaminated soils located along the upland areas adjacent to Ley Creek to meet the soil cleanup objectives (SCOs).
- Excavate PCB-contaminated sediment from Ley Creek exceeding the sediment criteria.
- Excavate PCB-contaminated sediment from the adjacent wetland areas to meet the sediment criteria.
- Cover with at least one foot of soil any contaminated soils that cannot be safely excavated due to existing oil and natural gas pipelines that run parallel to Ley Creek.
- Cap sediments under the U.S. Route 11 Bridge currently proposed for excavation, if necessary, to protect the structural integrity of the bridge.
- Cap other soils or sediments currently proposed for excavation that cannot be safely or effectively excavated (e.g., cap sediments due to the existing gas pipeline that crosses Ley Creek).
- Transport excavated contaminated soils and sediments containing PCB concentrations greater than 50 mg/kg to a Toxic Substances Control Act (TSCA)-compliant facility.
- Transport excavated soils and sediments that fail toxicity characteristic leaching procedure (TCLP) testing, are determined to be characteristic of hazardous waste, and are non-TSCA waste (i.e., PCB concentrations less than 50 mg/kg) to an offsite Resource Conservation and Recovery Act (RCRA)-compliant facility.
- Transport excavated soils and sediments that are not TSCA-regulated (i.e., PCB concentrations less than 50 mg/kg) and are determined to be uncharacteristic of hazardous waste to a local disposal facility (LDF), if available/feasible. If a local disposal option is not available, these materials will be sent to an appropriate non-local disposal facility for disposal.
- Perform a detailed hydrologic analysis to determine the effect of the remedy on stream flow, flooding and dynamics, and to identify the appropriate materials and bathymetry for restoration and long-term sustainability.

- Backfill the excavated wetland areas with soil that meets the unrestricted SCOs.
- Restore excavated soil areas with clean substrate and vegetation consistent with an approved habitat restoration plan to be developed as part of the RD.
- Place at least one foot of substrate similar to the existing sediments over disturbed sediment areas and restore vegetation.
- Implement (i.e., property records in the County Clerk's Office of Onondaga County) institutional controls in the form of an environmental easement/restrictive covenant that will, at a minimum, restrict the use of the properties within the Subsite to commercial uses and restrict intrusive activities in areas where residual contamination remains unless the activities are in accordance with a USEPA-approved Site Management Plan (SMP).
- Develop an SMP that will provide for the proper management of all post-construction remedy components.[2]

Additionally, as discussed in Section 1.2.6, per the ROD, as the RD progresses a Phase IA CRS will be performed to document the Subsite's historic resources, if any.

PDI activities performed between 2017 and 2019 resulted in refinements to the removal limits described in the ROD based on a comparison of historical and PDI data to the PCB cleanup goals and/or the SCOs for metals as defined in the ROD. The removal limits presented in the USEPA-approved RDWP (Arcadis 2021) are illustrated on Figures 1-3a through 1-3j; (these limits are further adjusted for constructability, as described in Section 2.2.1).

The PCB cleanup goal for sediment remediation includes removal or capping of material with PCB concentrations that exceed 1 mg/kg, which was established based on NYSDEC Technical Guidance for Screening and Assessment of Contaminated Sediments (NYSDEC 2014). PCBs are collocated with the majority of other sediment constituents of concern (COCs), including metals. As presented in the ROD, addressing PCB concentrations that exceed 1 mg/kg is expected to address risks associated with other sediment COCs (primarily metals) (USEPA 2014).

The PCB cleanup goals for soil remediation include removal or capping of material with PCB concentrations exceeding 1 mg/kg in the upper 2 feet and/or 10 mg/kg below 2 feet. Additionally, as presented in the ROD, USEPA adopted NYSDEC SCOs as the metals cleanup standards for soil remediation at the Subsite. The Subsite-specific SCOs are shown in Table 1-5 below.

[2] The SMP will describe procedures to confirm that the requisite engineering (e.g., subsurface demarcation layer) and institutional controls (e.g., environmental easement/restrictive covenant) are in place and that nothing has occurred that will impair the ability of said controls to protect public health or the environment. The SMP will also include: a soil management plan; an inventory of any use restrictions; the necessary provisions for the implementation of the requirements of the above-noted environmental easement and/or restrictive covenant; a provision for the performance of the operation, maintenance, and monitoring required by the remedy and a provision that the property owner or party implementing the remedy submit periodic certifications that the institutional and engineering controls are in place.

Table 1-5. Soil Cleanup Objectives

Chemicals of Concern	Surface Soil – top 2 feet (mg/kg)	Subsurface Soil – deeper than 2 feet (mg/kg)
Arsenic	13	16
Cadmium	4	9.3
Trivalent Chromium	41	1,500
Copper	50	270
Lead	63	1,000
Mercury	0.18	2.8
Nickel	30	310
Silver	2	1,500
Zinc	109	10,000

Because PCBs are collocated with the majority of other COCs, addressing PCB concentrations that exceed the cleanup goal for soils will address risks associated with other soil COCs (primarily metals) (USEPA 2014). However, in development of the removal limits for the selected remedy, in select situations where PCBs are below the established PCB cleanup goal, but historical metals results are slightly above the SCOs, a determination of whether the soil removal limit is included in the RD was reviewed on a case-by-case basis in consultation with USEPA.

1.4 Remedial Action Objectives

The ROD established the following Subsite-specific Remedial Action Objectives to protect human health and the environment:

- Reduce or eliminate any direct contact and ingestion threat associated with contaminated soils and sediments.
- Minimize exposure of ecological receptors to contaminated soils and sediments.
- Reduce the cancer risks and non-cancer health hazards associated with eating fish from Ley Creek by reducing the concentration of contaminants in fish.

1.5 Remedial Design Process

The purpose of this Preliminary RD is to describe the conceptual framework of the design and include a design criteria report (e.g., project description, design requirements and provisions), preliminary drawings, and a list of specifications to be prepared as the RD progresses to address soil and sediment contamination at the Subsite, consistent with the 2014 ROD, AOC, and subsequent revisions to the remedy scope discussed in Section 1.2. The Preliminary RD includes a description of how the remedial action (RA) may be implemented in a manner than

minimizes environmental impacts in accordance with USEPA Principles for Greener Cleanups (USEPA 2009). Additionally, as required by the RD SOW (USEPA 2016), the Preliminary RD includes:

- Descriptions of substantive permit requirements (i.e., permit equivalency package) (Section 4.2)
- Descriptions of monitoring and control measures that will be implemented to protect human health and reduce environmental impacts during the RA (e.g., air monitoring, dust suppression) (Section 5.3)
- Preliminary Habitat Restoration Plan (Appendix A)
- Preliminary Design Drawings (Appendix B)
- List of Proposed Specifications (Appendix C)[3]
- Preliminary Transportation and Non-Local Disposal Plan (TDP; Appendix D).

The RD will be completed as a phased process with three additional stages of design. After USEPA approval of the Preliminary RD, the RD Respondents will prepare the following additional RD reports for USEPA submittal iteratively, with each report including more detail as the RD progresses through each design stage, and addressing USEPA's comments on the prior submittal, as appropriate.

- Intermediate (60%) RD Report (Intermediate RD): The Intermediate RD will include reports, plans and specifications at an increased level of detail, including:
  - An updated draft set of construction drawings and initial draft specifications
  - A specification for photographic documentation of the RA
  - Intermediate versions of the elements and deliverables presented in the Preliminary RD, including an Intermediate Habitat Restoration Plan and Intermediate TDP.
- Pre-Final (95%) RD Report (Pre-Final RD): The Pre-Final RD will include near final reports, plans, and specifications for submittal to USEPA for review and comments, including:
  - A complete set of construction drawings and specifications for implementation of the RA, including survey and engineering drawings showing existing OU features (e.g., property boundaries, easements)
  - An updated (as appropriate) specification for photographic documentation of the RA
  - Pre-final versions of the elements and deliverables presented in the Preliminary RD and Intermediate Design, including a Pre-Final Habitat Restoration Plan and Pre-Final TDP
  - Initial draft versions of the SMP, Institutional Controls Implementation and Assurance Plan (ICIAP), and Periodic Review Support Plan (PRSP).

  Additionally, the Pre-Final RD will include updates to the Emergency Response Plan (ERP) originally submitted with the PDI Work Plan (Arcadis 2016).
- Final (100%) RD: The Final RD will include finalized plans and specifications suitable for procuring contractors to perform the remedy, including:

[3] Proposed Specifications are referenced throughout the Preliminary RD by title to indicate intent of content; the substance of each Specification will be developed as the RD progresses.

- Final versions of the TDP and Habitat Restoration Plan
- Revised draft versions of the SMP, ICIAP, and PRSP
- Drawings and specifications advanced to a level suitable for contractor bidding and ready to be sealed by the Engineer(s) of Record.

After USEPA approval of the Final RD, and as requested by USEPA in their March 22, 2021 comments on the February 2021 RDWP, the Quality Assurance Project Plan submitted with the PDI WP will be reviewed and revised as necessary to support the RA.

Periodic meetings between USEPA, the RD Respondents, and the Design Engineer will be scheduled as needed to discuss the status of the ongoing RD efforts, upcoming events, deliverables, and to resolve any issues that may arise. The schedule for these meetings will be determined in consultation with USEPA.

2 Basis of Design

The following subsections present a basis for the key design components.

2.1 Sequencing and Site Preparation

Based on the review of the removal volumes, anticipated rates of removal, available access points, it is anticipated the RA will be completed in two construction seasons as follows:

- Phase 1 – soil and sediment removal between U.S. Route 11 and 7th North Street
- Phase 2 – soil and sediment removal between 7th North Street and Interstate 81.

The design and location of the temporary staging area/facility(s), access roads, and temporary creek crossings for Phase 1 and Phase 2 considers removal operations and material transport throughout the Subsite as well as the space available and ease of access. It is anticipated sediment removal in Phase 1 will be performed from access roads on either bank of Ley Creek, while sediment removal will be performed from the barges in the water in Phase 2 removal areas.

Available areas for the temporary staging area/facility(s), access roads, and temporary creek crossings are determined based on available topographic information and likely ability to negotiate access to the properties not owned by the RD Respondents. The specific staging area/facility(s) location and size will be designed by the selected Remediation Contractor based on the removal volumes and anticipated rates of removal, and an evaluation of the removal operations and sequencing. The selected Remediation Contractor will be required to limit vegetation clearing, to the extent practicable, during site preparation.

The material, utility, and structural requirements and other performance specifications for the temporary staging area/facility(s) design elements will be developed as the RD progresses.

2.2 Construction Monitoring and Environmental Controls

Construction monitoring will be required during construction activities to identify and address, if necessary, temporary impacts that may arise during RA construction activities. Anticipated construction monitoring includes:

- Water quality monitoring for turbidity and PCBs
- Air monitoring for airborne particulates 10 microns in diameter or smaller (PM_{10}) and volatile organic compounds (VOCs), as well as sampling for PCBs
- Structural survey and geotechnical monitoring.

The corrective action levels to be utilized during construction activities will be developed as the RD progresses and specified in Specification Sections 01 57 05, Temporary Controls, 01 35 49, Community Air Monitoring Plan, 02 21 19, Structural Surveys, and 31 09 13, Geotechnical Instrumentation and Monitoring, respectively (Appendix C). The basis for the corrective action levels for turbidity, PM_{10}, and VOCs will be based on relative readings "above background" (i.e., upstream, or upwind locations). The basis for the corrective action levels for PCB air and PCB water concentrations will be based on ambient PCB concentrations observed during baseline monitoring (see the Baseline Monitoring Plan [BMP] included as Appendix A to the RDWP [Arcadis 2021], and approved by USEPA on September 7, 2021, for baseline monitoring requirements). Specifically, it is anticipated

the results for the two sampling events for both PCB air and PCB water concentrations will be averaged to determine ambient PCB concentrations, with qualitative consideration, as appropriate, for site conditions at the time of each sampling event. Final action levels will be submitted for USEPA review and approval prior to initiation of intrusive construction activities (for air) or in-water construction activities (for water).

The design and location of proposed upland environmental erosion and sediment controls (e.g., silt fence, straw/hay bales) is based on general industry standards for stormwater pollution protection. Erosion controls are designed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (NYSDEC 2016). Perimeter erosion controls are proposed downgradient of disturbed areas and for the protection of natural resource areas (i.e., wetlands). Areas where erosion controls are proposed along the perimeter of a removal area adjacent to standing water/ponds will be further evaluated as the RD progresses. In addition, rock construction entrances have been proposed at site entrances. Erosion and sediment control notes and details will be developed as the RD progresses. Additional or modified controls may be proposed during subsequent design phases.

The design and location of proposed in-water environmental controls (e.g., turbidity curtains) will be further developed as the RD progresses.

2.3 Flood Contingency Measures

The existing conditions hydraulic model (Section 1.2.3) will be used to perform a hydraulic analysis to assess the impacts during implementation of the remedy (and post-restoration, as discussed in Section 2.7.3) on stream flow, flooding, and overall dynamics as the details of the remedy are determined as the RD progresses. Specifically, the existing conditions hydraulic model will be used to assess the need for installing temporary flood contingency measures (e.g., sandbag berms) to support the adjacent property from rising creek water while temporary construction support facility(s)/structure(s) (e.g., river crossings) are in place.

If a flood occurs during construction and flood water accumulates within an open soil excavation, the Remediation Contractor may pump out the work area to facilitate continuation of the RA. Such contact water will be collected and transported to the onsite temporary water treatment system (TWTS) for treatment prior to discharge.

2.4 Soil and Sediment Removal Extent

The soil and sediment removal limits presented herein are based on the results from the PDI sampling efforts and additional historic investigation results presented in the ROD. The removal limits presented on Design Drawings C-101 through C-108 are consistent with those presented in the USEPA-approved RDWP and adjusted slightly for implementability and updated site conditions. Specifically, the boundaries of SOIL-C, SOIL-D, and SOIL-E were extended up to the adjacent sediment removal in narrow areas, not identified for removal in the RDWP. Additionally, the boundary of the sediment removal areas has been adjusted to the estimated typical water line which is represented by the water line surveyed in 2017 during the PDI, as that boundary between sediment and soil is more aligned with the existing topography.

Soil removal will range to depths of 0.5 to 14 feet and sediment removal will range to depths of 1 to 10 feet.[4] Estimated excavation volumes (neat-line, in-situ) include:

- Excavation of an estimated 92,400 cubic yards of impacted soils located on the northern and southern banks of Ley Creek
- Excavation of an estimated 74,000 cubic yards of impacted sediment from Ley Creek.

The removal boundaries will be further refined as the RD progresses to accommodate the results of the following constructability considerations and supporting design studies:

- Offset evaluation adjacent to critical areas (e.g., bridges, roads, railroads) and subsurface utilities, as detailed in Section 2.4.1
- Excavation stability/support evaluation for deeper sediment and soil removal areas, as detailed in Section 2.4.2
- CRS, as described in Section 1.2.6.

Upon completion of the evaluations summarized above, removal grades will be developed in the form of elevation contours as the RD progresses to illustrate the design removal extent. As stated in Section 1.3, in areas where removal to the depth currently proposed cannot occur, then a combination of capping and removal or capping only (instead of removal) will likely be used to address the impacted soil or sediment (see Section 2.7 for the basis for cap design). The potential need for capping for material not removed within offset limits and/or due to excavation stability/support sloping will be further evaluated as the RD progresses.

2.4.1 Offsets from Known Critical Areas and Subsurface Utilities

An offset evaluation was performed of existing known critical areas (e.g., bridges, roads, buildings, parking lots, railroad) and subsurface utilities to determine whether removal of impacted material can be performed safely and effectively within the vicinity of these critical areas.

Known critical areas within the Subsite are illustrated on Design Drawing G-101 through G-108 (Appendix B). The specific critical areas identified within or adjacent to removal areas are summarized in Table 2-1 below, along with minimum offsets required for each of these known critical areas, which are also illustrated on Design Drawing G-101 through G-108. The minimum required offsets are based on the following: engineering judgement; where applicable, federal rail safety laws; typical distances from these types of critical areas; and, for abutments and other structural components, avoiding disturbance within the zone of influence of the foundations or other components. The RD will continue to evaluate a detailed structural assessment of the features presented in Table 2-1 based on geotechnical data collected during the PDI and infrastructure as-built conditions to be confirmed with the owners. The design will use the assessment to evaluate the extent of restricted areas and whether specific sample locations with COC concentrations above the cleanup goals for remediation are located within the minimum required offset and evaluate potential modifications to the remedy that can be implemented to eliminate exposure risks if complete removal of impacted material in these areas cannot be performed (i.e., capping). Updated removal area limits that include these offsets will be developed as the RD progresses, including further evaluation of potential reduction of offset limits in some specific and limited areas.

[4] As noted in Section 1.2, in certain areas soil or sediment may be capped instead of removed based on proximity to infrastructure and/or utilities.

Table 2-1. Known Subsite Critical Areas and Minimum Required Offsets

Feature	Removal Area(s) Affected by Offset (Proposed Removal Depth)	Minimum Required Offset (from Edge of Critical Area/Structure)
U.S. Route 11 Bridge Abutments	SED-J9 (5-foot) SED-J11 (7-foot) SOIL-L (2-foot)	10 feet, see Note 1
U.S. Route 11	SOIL-L (2-foot)	10 feet
Existing Building	SOIL-D (2-foot)	10 feet
7th North Street Bridge Abutments	SED-EF (2-foot)	10 feet
7th North Street	SOIL-C (2-foot) SOIL-E (2-foot)	10 feet
Existing Parking Lot	SOIL-C (2-foot)	10 feet
CSX-owned Railroad Bed	SOIL-R1 (2-foot) SOIL-R2 (2-foot) SOIL-R3 (2-foot) SOIL-R4 (2-foot)	10 feet, see Note 2

Notes:
1. Evaluations for the U.S. Route 11 Bridge Abutments will be further developed as the RD progresses to accommodate offsets and potential excavation support based on engineering judgement, typical distances from similar structures, and avoiding removal within the zone of influence of the existing foundations. At a minimum, a 10-foot offset from edge of abutments will be employed; additionally, sloping (minimum 3:1 horizontal:vertical [H:V] slope from edge of offset to the target removal depth) and/or possible excavation support will be used to avoid the zone of influence of the foundation and to remove as much material as possible. Structural survey and geotechnical monitoring will be employed on the bridge abutments to monitor any potential movement or unforeseen disturbances during remedial activities (see Section 5.3).
2. Discussions with CSX regarding offsets and temporary removal conditions, with regard to removal areas adjacent to the CSX-Railroad (SOIL-R1, SOIL-R2, SOIL-R3, SOIL-R4), will be further clarified and developed as the RD progresses. Temporary removal condition requirements by CSX along with engineering judgement, will apply to sequencing removal adjacent to the railroad tracks, timing of removal, and timing of backfilling to original grade. Additionally, slope stability will be further evaluated as the RD progresses with consideration for sequencing requirements for removal and backfill, removal conditions (sloping, soil type, etc.), and anticipated train activity.

Known utilities are illustrated on Design Drawing G-101 through G-108 (Appendix B). The specific subsurface utilities identified within removal areas are summarized on Table 2-2 below, along with minimum offsets required for each of these known subsurface utilities, which are also illustrated on Design Drawing G-101 through G-108. The minimum offsets are based on information gathered during the PDI, as-built maps, owner requirements and/or additional DigSafe requests. The RD will continue to evaluate the extent of these restricted areas whether specific sample locations with COC concentrations above the cleanup goals for remediation are located within the minimum required offset and evaluate potential modifications to the remedy that can be implemented to eliminate exposure risks if complete removal of impacted material in these areas cannot be performed (i.e., capping). Updated removal area limits that include these offsets will be developed as the RD progresses, including further evaluation of potential reduction of offset limits in some specific and limited areas.

Table 2-2. Known Subsite Subsurface Utilities and Minimum Required Offsets

Type of Utility	Removal Area(s) Affected by Offset (Proposed Removal Depth)	Minimum Required Offset
Gas line	SOIL-L (2-foot) SED-I (2-foot) SOIL-E (2-foot) SED-EF (2-foot) SOIL-D (2-foot) SOIL C (2-foot) SOIL-B (2-foot) SED-A (1-foot)	15 feet
Water line	SOIL-L (2-foot) SED-J9 (5-foot) SED-J10 (6-foot) SED-J11 (7-foot) SED-L (5-foot) SOIL-L6 (2-foot) SOIL-L3 (2-foot) SOIL-L8 (4-foot) SED-I (2-foot) SOIL-C (2-foot)	15 feet
Sanitary sewer pipe	SED-J10 (6-foot) SED-J9 (5-foot) SOIL-L (2-foot) SOIL-L8 (4-foot) SOIL-L9 (3-foot) SED-F1 (5-foot) SED-F2 (3-foot) SED-F3 (4-foot) SOIL-E (2-foot)	15 feet
Storm drainpipe	SOIL-D (2-foot) SOIL-R1 (2-foot)	10 feet
Underground utilities (electric, communication, CATV, telephone, fiber)	SED-EF (2-foot) SOIL-L8 (4-foot) SOIL L-9 (3-foot) SOIL-L (2-foot) SOIL-R2 (2-foot) SOIL-R1 (2-foot)	10 feet

2.4.2 Excavation Stability

The existing topographic and bathymetric contours, available geotechnical results from the PDI, and historical borings have been used, as appropriate, in support of the excavation and/or bank stability evaluations being performed as part of the RD. Geotechnical parameter laboratory testing during the PDI, boring logs, and

engineering judgement provide a basis of design for the soils and sediment parameters used in the associated stability evaluations.

2.4.2.1 Soil Removal

Soil removal areas 4 feet or less will be completed using a combination of vertical slopes (4 feet in height or less) as needed during implementation based on field conditions and adjacent removal areas. Soil removal areas deeper than 4 feet will be completed using a combination of benching and sloping as needed during implementation based on field conditions and adjacent removal areas. Soil removal areas deeper than 4 feet are generally adjacent to and surrounded by shallower soil removal areas, and in these cases, the adjacent shallower removal (4 feet or less) adjacent to removal areas deeper than 4 feet will be benched down at 4-foot vertical slopes and/or at a 2:1 H:V slope to the bottom of adjacent deeper removal area. The toe of the 2:1 H:V slope will be at the outer boundary of the deeper excavation removal area with additional removal of the adjacent shallower removal area. Deeper than 4-foot removal areas not adjacent to shallower than 4-foot removal areas will utilize 2:1 H:V slopes with the toe of the slope at the outer boundary of the removal area. Typical examples of these soil removal approaches are illustrated on Figure 2-1.

It is anticipated utilization of 2:1 H:V sloping will result in removal of additional material beyond the neat-line removal extents illustrated on Design Drawings C-101 through C-108. If possible, material removed beyond the neat-line removal extent will be segregated for potential reuse as general backfill; however, if segregation is not feasible, the material will be handled and disposed based on the waste classification of the adjacent removal polygon. Soil removal areas that are noted to utilize 2:1 H:V sloping will be further evaluated as the RD progresses to determine whether additional measures besides 2:1 H:V sloping (e.g., shoring) could be taken to achieve the target excavation depth while limiting removal of additional material beyond the neat-line removal extents. Additionally, based on the deep target removal depth and location of removal areas SOIL-L4 (14-foot removal), SOIL-L5 (8-foot removal), and SOIL-L7 (10-foot removal), additional consideration for use of excavation support in association with 2:1 H:V sloping will be further evaluated in the RD. Updated removal area limits that include required excavation stability considerations will be developed as the RD progresses.

Below is an example of the application of the approach outlined above for removal at SOIL-L5 (8-foot removal, as seen on Design Drawing C-101):

- Where adjacent to SED-L1 (8-foot removal), no benching or sloping is needed; continue bottom of excavation bottom into adjacent area, resulting in no anticipated expansion or reduction in removal areas or volumes.
- Where adjacent to SED-L (5-foot removal), utilize a 3-foot vertical cut at the boundary of the removal areas, resulting in no anticipated expansion or reduction in removal areas or volumes.
- Where adjacent to SOIL-L (2-foot removal), utilize 2:1 H:V slope, with toe of slope at the limits of SOIL-L5 (deeper excavation area) or excavation support, resulting in possible expansion of removal areas and volumes, to be further evaluated as the RD progresses.

Note, the removal approach summarized above will be utilized for sediment removal areas SED-L (5-foot removal) and SED-KL1 (2-foot removal) based on lack of standing water present and boring data at these locations.

2.4.2.2 Sediment Removal

The excavation stability approach for sediment removal areas includes utilization of 3:1 H:V sloping, and for deeper excavation areas possible excavation support, to be further developed and evaluated during the RD process. Sediment removal areas of any target removal depth will be completed using 3:1 H:V slopes from adjacent removal areas (soil or sediment). When the adjacent shallower removal area is a sediment removal area, the toe of the 3:1 H:V slope will begin at the intersection of the two removal areas and with additional removal of the adjacent shallower removal area. When the adjacent shallower removal area is a soil removal area or if the adjacent area is not targeted for remediation, the top of the 3:1 H:V slope will be at the limit of the sediment removal area to reduce unnecessary disturbance to the banks of Ley Creek, resulting in a wedge of sediment being left behind for excavation stability. Typical examples of these sediment removal approaches are illustrated on Figure 2-2.

As the RD progresses, additional considerations including cost, accessibility, implementation, location, and volume of material left behind, and sediment sample locations will be considered for use of excavation support (e.g., sheet piles, trench boxes) for areas with excavation deeper than 4 feet. Updated removal area limits that require excavation stability considerations will be developed as the RD progresses.

Below is an example of the application of the approach outlined above for removal at SED-G (8-foot removal, as seen on Design Drawings C-102 and C-103):

- Where adjacent to SED-G12 (5-foot removal), SED-G8 and SED-G10 (6-foot removal), and SED-G11 (7-foot removal), utilize 3:1 H:V sloping starting from the limits of SED-G to the bottom of SED-G excavation area, resulting in possible reduction in removal areas or volumes.
- Where adjacent to SOIL-D1 (2-foot removal) and SOIL-D2 (3-foot removal), utilize 3:1 H:V sloping starting at the limits of SED-G and/or utilize excavation support, resulting in possible expansion or reduction in removal areas, to be further evaluated as the RD progresses.
- Where adjacent to SED-G7 (9-foot removal), utilize 3:1 H:V sloping starting from the limits of SED-G7, to the bottom of SED-G7 excavation area, resulting in possible reduction in removal areas or volumes.

2.4.3 Approach for Sediment Removal

It is anticipated the means and methods for sediment removal will include mechanical removal in the wet. The decision to remove in the wet is primarily based on the following considerations:

- The lack of competent subgrade material, as summarized in the PDI Data Summary Report (Arcadis 2020), would make installation difficult for a temporary diversion structure to dewater the work areas.
- Installation of a bypass system would require large amounts of steel sheetpile, adding to cost and schedule and resulting in reduced sustainability.
- Although the typical flow in the Ley Creek drainageway system would not require significant bypass capacity, the bypass capacity would need to be designed to handle sudden increases to flow observed in this system, which are significantly larger due to extensive runoff from surrounding areas during storm events.
- Turbidity curtains can be used to mitigate impacts to water quality given average daily mean main channel velocities of approximately 0.2 to 1.0 fps (see Section 1.2.3) and average channel widths of approximately 50 to 100 feet.

Additionally, not installing a temporary diversion structure will optimize the schedule to facilitate achievement of completion of the RA in two construction seasons.

2.5 Handling, Dewatering, Stabilization, and Final Transport and Disposal of Impacted Material

Results of the treatability study performed during the PDI suggest that passive dewatering, particularly in light of the ability to mix excavated sediments with similarly excavated upland soils, is sufficiently able to provide for primary dewatering and preparation for material stabilization. Even without the benefit of adding drier upland soils, Portland cement additive ratios were identified on a removal area-specific basis with resultant materials able to pass paint filter testing and meet proposed materials strength goals for placement in the LDF. Additionally, the settling of materials observed in jar tests and the results of pre- and post-stabilization waste characterization analyses during the PDI suggest there is likely no need for enhanced dewatering or materials separation techniques (e.g., flocculant addition) before water treatment.

PDI activities included waste characterization based on composite sample collection from 12 upland soil locations and nine sediment locations. The composite waste characterization samples were submitted for laboratory analysis for typical TCLP parameters; all TCLP concentrations detected were well below the applicable TCLP hazardous waste standards. The TCLP results and treatability results discussed in Section 2.5 indicate the vast majority of materials targeted for excavation are classified as non-hazardous. These wastes will be handled at an existing LDF or will be sent to an appropriate non-local facility for disposal. There are no wastes that require transport and disposal at an offsite RCRA-compliant facility.

In addition to the TCLP results, PCB concentrations observed during soil and sediment sampling were evaluated to delineate areas of TSCA-regulated waste, which will be transported offsite for disposal rather than handled at an existing LDF. Specifically, materials subject to removal that have PCB concentrations greater than or equal to 50 mg/kg will be regulated for disposal under TSCA regulations (40 Code of Federal Regulations [CFR] Part 761), whereas the remaining materials with PCB concentrations less than 50 mg/kg are considered non-TSCA material. To define the limits of TSCA-regulated material, polygons were established around the sampling locations representative of PCB concentrations 50 mg/kg or greater, generally using sampling locations with PCB concentrations less than 50 mg/kg as the boundary for material to be handled as TSCA-regulated waste (see Design Drawings C-101 through C-108). Estimated volumes for each waste stream (neat-line, in-situ) include:

- Excavation of an estimated 130,000 cubic yards of non-TSCA impacted material
- Excavation of an estimated 36,400 cubic yards of TSCA impacted material.

2.6 Capping

Based on the results of the offset and excavation stability/support evaluations (Section 2.4), engineered capping may be required in areas where soil or sediment cannot be removed safely and effectively due to the presence of utilities and structures. At a minimum, as specified in the ROD, the following areas will be considered for capping as part of the RD:

- Contaminated soil located on the northern bank of the Creek that cannot be safely excavated because of the presence of buried natural gas and oil pipelines will be covered with a least 1 foot of soil. Prior to placing the

soil cover, a readily visible and permeable subsurface demarcation layer delineating the interface between the contaminated soils and clean soil cover will be installed.

- A combination of dredging and capping of sediments under the U.S. Route 11 Bridge will be considered in the design to protect the bridge and not reduce the effective cross section of flow for flood protection.
- Cap other soils or sediments currently proposed for excavation that cannot be safely or effectively excavated (e.g., cap sediments due to the existing gas pipeline that crosses Ley Creek).

Additional removal areas that cannot be safely or effectively excavated and are being considered as the RD progresses for capping include:

- Contaminated sediment or soil within the 10-foot offset from critical areas/structures (Table 2-1)
- Contaminated sediment or soil within the 10- to 15-foot offset from known subsurface utilities (Table 2-2)
- Contaminated sediment within the proposed neat-line removal extents within the 3:1 H:V sloping proposed in Section 2.4.2.2.

Cap configurations and capping elevations will be developed further as the RD progresses for these areas where removal cannot be performed, and the extent will be added to the Design Drawings and material specifications will be added to Specification Section 31 05 16, Aggregates for Earthwork. Estimated cap material volumes, placement requirements, and performance standards will also be developed as the RD progresses. Final site conditions will be evaluated to confirm that no net fill is placed at the Subsite. If a net fill condition is found, then additional removal or a reduction in backfill may be proposed to offset the excess fill quantity.

The types of cap materials that will be considered as the RD progresses will generally include soils and/or various types of aggregates. In general, engineered caps may consist of a variety of materials either placed in distinct layers or mixed together prior to placement. The cap design will evaluate cap performance based on cap material properties, PCB concentrations present in impacted soil or sediment, hydrodynamic conditions, erosive forces (e.g., ice and wave impacts), aquatic habitat compatibility, and existing floodplain and creek bed conditions.

The RD will also include constructability reviews related to material availability, placement techniques, and operational considerations. The initial capping evaluation will be used to develop potential cap configurations that will be protective of human health and the environment by providing physical isolation and stabilization of soil or sediment in non-removal areas.

2.7 Backfill and Habitat Restoration Plan

In accordance with the RD SOW, the description of backfill and habitat restoration activities to be undertaken after the implementation of soil and sediment removal activities, including the basis for that design, is provided in Appendix A, Habitat Restoration Plan. Based on the planned extent of remediation and expected disturbance of the habitats established during the PDI, the preliminary Habitat Restoration Plan describes the approaches used to reconstruct habitats to their intended function and provides the preliminary goals and objectives to identify typical restoration approaches for the various site habitats. The plan for habitat restoration:

- Identifies the types and extent of backfill materials to be placed in each delineated area.
- Identify the types and locations of any seeding and plantings to be place in each delineated area.

- Establish design expectations for habitat construction in soil excavation areas and excavated wetland areas: the restoration will meet the substantive requirements of 6 NYCRR Part 608 and 663.
- Identify requirements for monitoring the restored habitat after completion of the remedial construction to assess restoration success and restoration maintenance.
- Consider actions needed, if any, for the protection of affected species.

A summary of the soil and sediment backfill design is provided in the remainder of this section.

2.7.1 Soil Backfill

In accordance with the ROD, soil removal areas will be backfilled with fill material meeting the criteria set forth in the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 5 (NYSDEC 2010) and the NYSDEC guidelines for Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (NYSDEC 2021). Ecologically sensitive wetland areas identified during the PDI will be backfilled with soil that meets unrestricted SCOs presented in Appendix 5 (NYSDEC 2010). Subsurface soil backfill material will be selected based on typical general fill materials provided in the New York State Department of Transportation Standard Specifications (2008). In addition, material selection, particularly for the surface soils, will be based on the habitat types identified during PDI wetland and habitat characterization activities.

Except for removal area SOIL-G (for which the proposed removal depth is less than 2 feet), as specified in the ROD, the backfill thickness will be at least 2 feet. As presented in the ROD, excavation of the southern bank soils (i.e., SOIL-E, -H, -I, -I1, -I2, and -I3 as defined in the ROD) may not be backfilled to grade, thus increasing the flood storage capacity of this floodplain. Final backfill elevations in this portion of the Subsite and other areas will be further evaluated as the RD progresses based on flooding potential and desired habitat conditions. The hydrodynamic model (Section 1.2.3) will be used during the design to determine appropriate design elevations based on the existing bathymetry and topography and stream characteristics at the Subsite (e.g., stream velocities, flow, geometry).

2.7.2 Sediment Backfill

In accordance with the ROD, sediment removal areas will be backfilled with fill meeting the criteria of NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 5 (NYSDEC 2010).

For sediment removal areas, at least 1 foot of substrate similar to the existing sediments will be placed over disturbed sediment areas and vegetation will be restored consistent with the Habitat Restoration Plan. In areas of deeper removal, thicknesses of backfill will be greater to provide for stable transitions between adjacent removal areas and banks. Specifically, the backfill thicknesses and slopes will be developed as the RD progresses to create restored channel sides no steeper than 3:1 H:V, and transitions between restored sediment removal areas also no steeper than 3:1 H:V. Backfill grades will be developed in the form of elevation contours as the RD progresses to illustrate the design backfill extent. As with soil backfill, the hydrodynamic model (Section 1.2.3) will be used as the RD progresses to verify that the sediment backfill design will not alter existing stream flow characteristics (e.g., stream velocities, flow, geometry) such that there will not be an increased probability of flooding and erosion during normal flow conditions as well as high flow events. In addition, the hydrodynamic model may be used to evaluate appropriate material type based on flow conditions. Backfill materials will also be selected based on geotechnical data and aquatic habitat compatibility.

2.7.3 No-Rise Evaluation

The existing conditions hydraulic model (Section 1.2.3) will be used to perform a hydraulic analysis to assess the impacts of the completed remedy on stream flow, flooding, and overall dynamics as the details of the remedy are determined as the RD progresses, including a no-rise evaluation. The no-rise evaluation requires a hydrologic and hydraulic analysis to demonstrate that the proposed work will not result in an increase in base flood elevations during the occurrence of the base flood discharge.

3 Organizational Structure and Responsibilities

Development of the RD will be a collaborative effort between USEPA, the RD Respondents, the Design Engineer, and other supporting parties, as needed. The key entities involved with the development of the RD and their respective responsibility and authority are summarized in Table 3-1.

Table 3-1. Key Project Personnel and Summary of Roles

Name/Affiliation	Address and Contact Information	Role
RD Respondents		
Mr. Joseph A. Gregg Mr. Kevin C. Murphy Representatives for RD Respondents	Eastman & Smith Ltd. One Seagate 27th Floor P.O. Box 10032 Toledo, Ohio 43699-0032 T: 419.247.1657 jagregg@eastmansmith.com The Wladis Law Firm, P.C. 6312 Fly Road East Syracuse, NY 13057 T: 315.445.1700 kmurphy@wladislawfirm.com	Responsible for submission of all plans and submittals outlined in the RDWP, including this Preliminary RD.
RA Respondents: To be determined (TBD)		
TBD	TBD	Negotiations for access and the need to involve the agencies. Supervise implementation of the RA and related activities to confirm they are being conducted in accordance with the design. Direct/coordinate activities of the Remediation Contractor and other RA Respondent-contracted organizations.
USEPA		
Ms. Victoria Paris Sacks Remedial Project Manager	290 Broadway 19th Floor New York, NY 10007 T: 212.637.4291 sacks.victoria@epa.gov	Lead regulatory agency; may seek input from the NYSDEC and Onondaga Nation. Review and approve RD. Provide oversight of RA.

Name/Affiliation	Address and Contact Information	Role
Design Engineer: Arcadis		
Mr. Mark Gravelding, P.E. Project Coordinator and Engineer of Record Ms. Lauren Putnam Project Manager	110 West Fayette St., Suite 300 Syracuse, NY 13202 T: 315.671.9235 mark.gravelding@arcadis.com T: 315.671.9385 lauren.putnam@arcadis.com	Prepare RD. Manage communications with the agencies, unless otherwise directed by the Respondents or USEPA.
Remediation Engineer: TBD		
TBD	TBD	Supervise Remediation Contractor for the RD Respondents. Review Remediation Contractor submittals. Lead project coordination and documentation. Provide technical/engineering assistance related to the implementation of the RD. Assist in verifying that the RA is complete and performed in accordance with the RD. Provide environmental monitoring activities and post-removal sampling in accordance with the RD. Prepare and certify RA Report.
Remediation Contractor: TBD		
TBD	TBD	Implement all construction-related activities as outlined in the RD. Participate in construction progress meetings. Provide all labor, materials, equipment, and services necessary to complete the construction-related activities in accordance with the RD. Prepare any additional submittals, as necessary. Coordinate transport and disposal of removed materials.

Name/Affiliation	Address and Contact Information	Role
		Provide site health and safety monitoring activities for the Remediation Contractor's workers and subcontractors (if any).

The minimum responsibilities of RA Respondents, the Design Engineer, the Remediation Engineer, and the Remediation Contractor for work to be conducted prior to, during, and following implementation of the remediation activities are presented in the following subsections.

3.1 RA Respondents Responsibilities

The RA Respondents will be responsible for the following:

- Contracting with the selected Remediation Contractor.
- Contracting with a firm to serve as the Remediation Engineer.
- Coordinating with the Remediation Contractor and Remediation Engineer (as necessary) to implement the required work activities in conformance with the RD.
- Securing access agreements and coordinate with property owners (as needed) to facilitate implementation of the remediation activities, and, if needed, involving USEPA or NYSDEC in the access agreement process.
- Issuing contract addenda (if any) and modifications (if any) based on input from the Remediation Engineer and/or the USEPA.
- Acting as the "Generator" for the offsite disposal of waste material resulting from the RA.
- Coordinating with the USEPA regarding the RA and reimbursement of costs incurred by RA Respondents from the OU Disbursement Account in accordance with the provisions of the RA Consent Decree.

3.2 Design Engineer Responsibilities

The Design Engineer will provide the following services prior to and during (as necessary) implementation of the RA:

- Assist the RD Respondents with preparation of the RD.
- Manage communications with the agencies, unless otherwise directed by the RD/RA Respondents or USEPA.
- Assist the RA Respondents with procurement of an appropriate Remediation Contractor.
- Assist the RA Respondents with community relations and stakeholder communications prior to implementation of the RA.
- Issue formal design modifications (if necessary) signed and sealed by a New York State Licensed Professional Engineer.

3.3 Remediation Engineer Responsibilities

The Remediation Engineer will provide the following services during implementation of the RA:

- Coordinate with the Design Engineer, as needed, for requests for interpretation and clarifications on this RD.
- Provide experienced and qualified project management and full-time onsite oversight to observe and monitor the RA. The Remediation Engineer will have stop-work authority to facilitate inspection of completed work and address health and safety concerns, as needed.
- Conduct environmental monitoring (i.e., water column monitoring and sampling, air monitoring and sampling) during the RA, including baseline monitoring.
- Conduct post-removal sampling during the RA.
- Review Remediation Contractor submittals and provide comments, if any, to the Remediation Contractor and the RA Respondents.
- Initiate field orders and work change directives.
- Monitor the Remediation Contractor's survey control for evaluating performance of the RA in compliance with this RD and payment quantities, as applicable.
- Review the Remediation Contractor's daily geotechnical data and monitoring reports.
- Maintain records of the work efforts associated with implementation of the RA, including daily field reports and digital photographs of the work in progress and documentation of observations, problems, and deficiencies. Requirements for daily construction reports will be presented in Specification Section 01 32 00, Construction Progress Documentation.
- Maintain records of labor, materials, and equipment utilized for the RA and any unusual circumstances, if encountered.
- Document that the RA is conducted in general conformance with the RD and notify the RA Respondents of any deviations.
- Review and sign (as an authorized agent for the RA Respondents) waste manifests/bills of lading for shipments of waste materials generated by the RA.
- Maintain an onsite project log in consultation with the Remediation Contractor that summarizes and tracks the type and quantity of waste streams generated by the RA.
- Conduct soil, sediment, and water characterization sampling and/or coordinate such sampling with the Remediation Contractor. Includes coordination with an independent testing laboratory to perform material and quality assurance testing, as required, and provision, as needed, of analytical results to the RA Respondents for review and approval.
- Assist the RA Respondents in the review of Remediation Contractor invoices/requests for payment.
- Coordinate, attend, and document onsite project meetings, including, but not limited to, a pre-construction meeting, daily site safety (tailgate safety) meetings, weekly construction progress meetings, pre-final inspection (punch-list) meeting, and final inspection/project close-out meeting, to be specified in Specification Section 01 31 00, Project Management and Coordination.

- Prepare (and certify) an RA Report to document completion of the construction activities (as discussed in Section 6.1).
- Prepare a revised SMP to detail the post-remediation activities to be conducted at the project area, including vegetation monitoring (as discussed in Section 6.2).
- Provide the RA Respondents with support to resolve any issues during the RA.
- Issue formal design modifications (if necessary, and not issued by the Design Engineer). Design modifications will be signed and sealed by a New York State Licensed Professional Engineer.

3.4 Remediation Contractor Responsibilities

In general, the Remediation Contractor is responsible for providing all supervision, labor, equipment, and materials needed (unless otherwise noted) to implement the activities described in the RD. Remediation Contractor responsibilities are detailed in the Contract Documents, which includes this RD text, the Design Drawings (Appendix B), the Specifications (Appendix C), and the other supporting documents. The Remediation Contractor's responsibilities also include:

- Thoroughly reviewing the RD and Contract Documents and supplemental information provided herein. Nothing presented in one of the above documents or drawings should relieve the Remediation Contractor's obligation to satisfy the components specified in the other documents/ drawings.
- Verifying all existing site conditions.
- Implementing the activities described in the Contract Documents in a safe manner and in accordance with applicable federal, state, and local laws, rules and regulations.
- Performing surveys and survey control in accordance with the Contract Documents.
- Contracting with a third-party engineering firm to conduct geotechnical monitoring during construction activities and pre- and post-remediation structural surveys.
- Coordinating with potential disposal facilities to verify waste characterization analytical requirements prior to the collection of waste characterization samples.
- Conduct soil, sediment, and water characterization sampling and/or coordinate such sampling with the Remediation Engineer. Includes coordination with an independent testing laboratory to perform material and quality assurance testing, as required, and provision, as needed, of analytical results to the RA Respondents for review and approval.
- Preparing waste profiles for offsite disposal of solid and liquid wastes to be generated as part of the RA.
- Contracting with waste haulers and waste disposal vendors for disposal of non-hazardous solid and liquid wastes to be generated as part of the RA.
- Providing bills of lading (BOLs)/manifests for the offsite shipment of waste materials generated as a result of implementing the RA. These shipping documents may be provided to the Remediation Engineer to complete and sign on behalf of the RA Respondents, under separate agreement with the RA Respondents.
- Attending onsite project meetings including, but not limited to, a pre-construction meeting, daily site safety (tailgate safety) meetings, weekly construction progress meetings, pre-final inspection (punch-list) meeting

and final inspection/project close-out meeting, as specified in Specification Section 01 31 00, Project Management and Coordination.

- Submitting to the RA Respondents, daily construction reports detailing the work efforts associated with implementation of the remedial activities, including digital photographs of the work in progress and documentation of observations, problems, and deficiencies. Requirements for daily construction reports will be presented in Specification Section 01 32 00, Construction Progress Documentation.
- Coordinating with the RA Respondents and the Remediation Engineer, as necessary, to complete required work activities.
- Providing the Remediation Engineer with bulk samples of aggregate and fill materials, as required.
- Perform personnel air monitoring requirements as required by the Remediation Contractor's Health and Safety Plan (HASP).

Notifying the Remediation Engineer and the RA Respondents immediately upon discovery of a conflict between the Contract Documents and actual site conditions. The Remediation Contractor will present in writing to the RA Respondents and the Remediation Engineer any noted discrepancies in the information contained herein.

4 Pre-Remediation Activities

The following pre-remediation activities will be completed by the RA Respondents (and/or its representatives) or Remediation Contractor prior to or at the start of RA construction:

- Complete pre-removal assessment of historical sample locations L-7 and SS-19/SB-19.
- Obtain regulatory and local permits (or equivalency), access agreements, and other approvals.
- Complete pre-construction baseline monitoring.
- Prepare pre-mobilization submittals.
- Conduct a pre-construction conference.

The purpose of the pre-remediation activities is to coordinate with the local community and officials and to facilitate initiation of the RA. Additional information regarding the pre-remediation activities is provided in the following subsections.

4.1 Additional Pre-Removal Assessment

To address USEPA's concerns regarding historical sample results outside the ROD-defined removal limits (i.e., L-7 and SS-19/SB-19), a desktop evaluation and field reconnaissance assessment were performed to compare the relative location of historical samples with the site boundary of the Town of Salina Landfill RA. The desktop evaluation confirmed the historical samples were taken prior to the Town of Salina Landfill remediation, and that data collected from location L-7 by NYSDEC in 1996 are not considered relevant for design purposes due to concerns about temporal relevance and location accuracy. In addition, a field reconnaissance was completed on October 21, 2021 by the Design Engineer to assess the accuracy of the documented coordinates, whether the location of the historical samples appeared to have been previously addressed as part of the Town's RA, and/or whether the historical data are still representative of the in-situ material. The field notes and photographs documented during the field reconnaissance are provided as Appendix F.

For location L-7, information gathered during the desktop review and field reconnaissance indicates the coordinates as recorded by NYSDEC in 1996 do not accurately represent the in-field collection location. The coordinates map the sample on the north bank of Ley Creek away from the creek (see Appendix F); however, the NYSDEC classified location L-7 as a sediment sample and based on review of the program implemented in 1996 for sediment samples L-2 through L-6, it is expected that L-7 should represent sediment from within the Ley Creek channel limits. For example, samples L-2 through L-6 are all sediment samples located in the creek, logically L-7 the next sample ID in the sequence would likewise be expected to be located in the creek. As such, it is anticipated the material represented by location L-7 will be addressed as part of the remediation of sediment removal area SED-J9.

For location SS-19/SB-19, information gathered during the desktop review and field reconnaissance show the coordinates as recorded by NYSDEC in 2010 within a cleared area, indicating the area was disturbed during remediation of the Town of Salina Landfill. Because the depth intervals at SS-19/SB-19 with PCB concentrations greater than 1 mg/kg are in the top 1 foot with a PCB concentration less than 1 mg/kg immediately below (0.17 mg/kg, see Appendix F), it is expected that material exceeding the cleanup goal at location SS-19/SB-19 was addressed during clearing and grubbing for the Town of Salina Landfill remediation.

4.2 Permitting and Access Agreements

Based on the scope of the RA to be conducted at the Subsite and information currently available, the agreements/authorizations, permits, and/or notifications discussed below have been identified, at a minimum, as potentially applicable for the RA.

4.2.1 Permit Equivalency Package

Table E-1 in Appendix E identifies the laws or regulations that apply to the proposed work at the Subsite and provides information on how each will be addressed. This list was generated based on the analysis of Applicable and Relevant or Appropriate Requirements provided by USEPA in the ROD (USEPA 2014). Note that similar laws or regulations have been grouped together as appropriate.

4.2.2 Access Agreements

Obtaining access to non-Respondent properties within the Subsite will be required prior to construction of the remedy. Based on previous access agreements obtained during PDI activities, it is anticipated that similar results related to property access grants, in the form of written agreements, will be successfully obtained prior to implementation of the RA. The RA Respondents will use similar efforts made during the PDI activities to obtain access to non-Respondent properties within the Subsite prior to construction:

- Best efforts will be made pursuant to Section XI of the AOC to obtain written consent for access from the owners of all parcels needed to perform the RA (including all Respondent property owners). Properties that will likely require written consent for access from the owners are presented on Figure 4-1.
- A letter and access agreement form will be mailed to each of the non-Respondent owners, and follow-up attempts will be made, as needed, to contact (via telephone) any property owners that do not respond to the initial mailing. Prior to mailing letters, the owner names and addresses will be confirmed for the parcels illustrated on Figure 4-1 (and any others for which access is determined necessary as the RD progresses).

Negotiations for access and the need to involve USEPA or NYSDEC will be the responsibility of the RA Respondents.

4.3 Pre-Construction Monitoring

A BMP was included as Appendix A to the RDWP (Arcadis 2021) and approved by USEPA on September 7, 2021. The following activities will be completed prior to the start of intrusive or in-water RA construction activities in accordance with the BMP:

- Water monitoring for turbidity: Monitoring will be performed starting one week prior to intrusive in-water construction activities to evaluate naturally occurring background turbidity concentrations within the stream.
- Water sampling for PCBs: Water column samples will be collected twice in the month leading up to intrusive in-water construction activities to obtain representative water quality measurements of ambient PCB levels.
- Air monitoring for PM_{10} and VOCs: Monitoring will be performed starting two days prior to intrusive construction activities to evaluate naturally occurring background particulate and VOC concentrations at the Subsite.

- Air sampling for PCBs: Air samples will be collected twice in the month leading up to intrusive construction activities to obtain representative measurements of ambient air PCB levels.
- Structural survey: At least one week prior to intrusive construction activities, a Professional Engineer licensed in the State of New York will perform a pre-construction survey, which will include, but not be limited to, visual inspection and photographic documentation of the existing conditions of the surface structures located at the following:
    - The U.S. Route 11 Bridge and abutments
    - The 7th North Street Bridge and abutments
    - The existing municipal building located between SOIL-D and Bear Trap Creek
    - The existing parking lot adjacent to SOIL-C.

    The list of surface structures requiring structural survey will be further developed as the RD progresses.
- Geotechnical monitoring: Monitoring will be performed starting two days prior to intrusive construction activities at the following locations:
    - The U.S. Route 11 Bridge and abutments
    - The 7th North Street Bridge and abutments
    - The existing municipal building located between SOIL-D and Bear Trap Creek.

    The list of features requiring geotechnical monitoring will be further developed as the RD progresses.

In addition, since submittal of the RDWP, the need for a pre-construction photographic survey was identified as a pre-construction monitoring requirement. The Remediation Contractor will conduct a pre-construction (before the start of site preparation) photographic survey of all temporary support/access areas or affected properties; the survey will be used during construction activities in accordance with Specification Section 01 71 23.16, Construction Surveying. Photographic surveys will also be performed post-construction (following restoration/ demobilization) for each area (see Section 5.12.2). The pre-construction survey for each area will serve as the baseline for the post-construction survey of that area. If work at either area requires more than one construction season, a photographic survey to document interim conditions of all temporary support/access areas or affected properties (i.e., prior to winter shut down and prior to restarting work) will be completed.

Monitoring to be performed during construction is described in Section 5.3. The SMP to be developed as the RD progresses will describe monitoring to be performed after completion of the RA.

4.4 Remediation Contractor Pre-Mobilization Submittals

The RA Respondents will select a Remediation Contractor that is qualified to complete the onsite construction activities, likely following USEPA's approval of the Final RD. The anticipated role of the Remediation Contractor is described in Section 3.4. The anticipated schedule for selecting the Remediation Contractor is discussed in Section 7.

Following contract award, the selected Remediation Contractor will be required to prepare pre-mobilization submittals for review by the RA Respondents and/or the Remediation Engineer to demonstrate that the Remediation Contractor: (a) has an adequate understanding of the scope of the RA; (b) has developed a project-

specific sequence that can efficiently perform all onsite activities within the allowable schedule; (c) will utilize acceptable materials, products, and procedures; and (d) will perform all activities in a manner that is protective of onsite workers and the surrounding community. The Remediation Contractor will not be allowed to mobilize to the Subsite prior to review and approval of all required pre-mobilization submittals. These submittals will include, but not necessarily be limited to, the following:

- Project Operation Plan (POP) – The POP is required to present the Remediation Contractor's detailed approach for implementing the pertinent work activities (incorporating, as necessary, plans, specifications, site maps, details, flow diagrams, charts, and schedules). The POP will include the following, at a minimum:
  - List of equipment to be used onsite.
  - Proposed plan for controlling vehicular and pedestrian traffic during the performance of construction activities. (The requirements for traffic control are discussed in the TDP; see Appendix D.)
  - Stormwater (including run-on and runoff), erosion, noise, and dust control measures.
  - The proposed approach and sequence for implementing the RA.
  - Materials handling and staging approach.
  - Equipment cleaning procedures.
- HASP – The Remediation Contractor will be required to prepare and submit a site-specific HASP (for use by onsite personnel during the removal action activities) to provide a mechanism for establishing safe working conditions at the Subsite. The HASP will be prepared in accordance with all applicable rules and regulations, including 29 CFR 1910 and 29 CFR 1926, and will be prepared by a Certified Industrial Hygienist. The Remediation Contractor is required to take all necessary precautions for the health and safety of onsite personnel in compliance with all applicable provisions of federal, state, and local health/safety laws and the provisions associated with the HASP. The Remediation Contractor will assume sole responsibility for the accuracy and content of its HASP.
- Preliminary Progress Schedule – The Remediation Contractor will be required to prepare a preliminary schedule that identifies major work items and work sequences.

Additional requirements regarding the content of these pre-mobilization submittals and the overall submittal process will be presented in the following Specification Sections (Appendix C):

- 01 15 00, Contractor's Project Operations Plan
- 01 32 00, Construction Progress Documentation
- 01 33 00, Submittal Procedures
- 01 35 29, Health, Safety, and Emergency Response Procedures.

The POP and HASP will be provided to USEPA for review and comment. In addition to the required pre-mobilization document submittals specified above, the Remediation Contractor will be required to prepare a submittal(s) specifying the proposed restoration material sources to be used during the performance of this project. (The requirements for handling and management [including characterization] of restoration material sources are discussed in Section 5.5.)

Finally, the Remediation Contractor will obtain any permits and agreements specific to their work (e.g., coordinate for any temporary traffic control within the adjacent roadway, for use of a crane [if needed]).

4.5 Pre-Construction Conference

A pre-construction conference will be held at the beginning of each construction season to designate responsible personnel, establish working relationships, discuss the preliminary schedule submitted by the Remediation Contractor, and review administrative and procedural requirements for the remedial construction activities. The Remediation Engineer will be responsible for coordinating the pre-construction conferences. Prior to the conferences, the Remediation Contractor will provide the required submittals as to be presented in Specification Section 01 31 00, Project Management and Coordination.

5 Remediation Activities

This section presents a summary of the RA. Refer to the Design Drawings (Appendix B) and List of Proposed Specifications (Appendix C) for additional details and references.

As detailed in Table 5-1, RA construction activities are anticipated to be completed in two seasons. Implementation of this work is highly weather-dependent and can only be performed when river flow conditions allow for remedial construction activities to be completed in a safe manner. Additionally, work may be limited due to time restrictions based on achievement of the required access agreements.

The Remediation Contractor will make best efforts to complete the work identified within two construction seasons. As time allows, the RA will be conducted following the general sequence described in the table below.

Table 5-1. General Construction Sequence

Year	Activity
1 – Phase 1	• Mobilization and site preparation for Phase 1, including installation of temporary erosion and sedimentation controls • Excavation and restoration of Phase 1 removal areas • Restoration of Phase 1 support areas (if not needed for Phase 2) • Demobilization from Phase 1/winter shut down
2 – Phase 2	• Mobilization and site preparation for Phase 2, including installation of temporary erosion and sedimentation controls • Excavation and restoration of Phase 2 removal areas • Restoration of Phase 2 and any remaining Phase 1 support areas • Final Demobilization

A description of RA, including references to supporting information to be included elsewhere in the Contract Documents, is presented in the following subsections. Note that the information presented below does not provide a detailed description of the construction activities to be completed each year, rather the text generally includes the overall approach/requirements for various construction activities.

Where possible, the design includes a description of how the RA may be implemented in a manner that minimizes environmental impacts in accordance with USEPA Principles for Greener Cleanups (USEPA 2009).

5.1 Survey Control

The Remediation Contractor will retain a New York State licensed surveyor to conduct survey control during the RA. The Remediation Contractor will supply the survey information (including an as-built survey, signed and sealed by the Remediation Contractor's New York State licensed surveyor) to the Remediation Engineer for inclusion in the RA Report (see Section 6.1). Survey work associated with the RA will be performed in accordance with Specification Sections 01 71 23.16, Construction Surveying, and 01 77 00, Closeout Procedures.

The Remediation Contractor will conduct the following surveys in accordance with Specification Section 01 71 23.16, Construction Surveying:

- Pre-construction survey of the sediment removal areas to be conducted prior to initiation of the RA construction activities in each area (prior to disturbance of the areas). It is assumed the 2017 PDI topographic survey will be sufficient for representing the upland support areas (e.g., Phase 1 temporary support/access areas, Phase 2 temporary support/access areas) and soil removal areas; however, if additional disturbance is planned outside the limits of the 2017 PDI survey, that area will also be surveyed prior to initiation of the RA construction activities.
- Post-restoration survey of the restored areas, including the removal areas (post-backfill) and upland support areas surveyed during the pre-construction survey. The post-construction survey will be completed at the same x,y coordinates as the pre-construction survey.

It is anticipated the positioning system technology on the removal equipment will be sufficient to document and confirm horizontal and vertical limits of removal have been met. Requirements for vertical and horizontal surveys will be presented in Specification Section 01 71 23.16, Construction Surveying, and the vertical tolerance for the comparison of pre-construction and post-restoration surveys will be presented in Specification Section 01 71 23.16, Construction Surveying.

5.2 Site Security and Control Access

Access to the project area will be restricted by installing temporary perimeter fencing and gates, as shown on the Design Drawings (Appendix B). Security around active work areas, staging, handling, decontamination, and storage areas will be maintained during both work and non-work hours. The level of security will be dependent on the activities being performed and location of activities. Additional security measures will be taken by the Remediation Contractor to further limit construction area access during the RA, including:

- Temporary perimeter fencing and/or barriers, warning tape, and signs
- Maintenance of sign-in/sign-out sheets
- Implementation of safe work practices
- Use of private security (as necessary).

Temporary fencing/barriers will be installed and relocated, as needed, during the RA to limit access to the active work area. Site security, control, access, and warning sign requirements will be presented in Specification Sections 01 30 53, Security, and 01 58 13, Temporary Project Signage (Appendix C). Specific methods to be used by the Remediation Contractor for site security, control, and access will be specified in the Remediation Contractor's POP.

Work activities will be coordinated with third-party property owners, as necessary, to maintain uninterrupted safe access 24 hours per day, 7 days per week for residents, visitors, and/or emergency response personnel in accordance with Specification Section 01 31 00, Project Management and Coordination.

5.3 Traffic Control

A traffic management plan was developed to address traffic related to trucks hauling removed material and import material and is included in the TDP (Appendix D). Traffic management will be implemented for traffic safety during trucking operations and to minimize interference with local communities. Traffic management will consist of the following three components:

- Proposed routes that may be used by trucks and large construction vehicles to access the Subsite and transport waste material generated during the RA offsite.
- Identification of communities affected by shipment of waste material generated during the RA
- Description of plans to minimize impacts on affected communities.

The Remediation Contractor will be responsible for coordinating with the local agencies regarding traffic control for the entire duration of the project.

A proposed detailed plan for controlling vehicular and pedestrian traffic during construction activities will be included in the Remediation Contractor's POP.

Additional details regarding traffic controls will be presented in Specification Section 01 55 00, Temporary Access Roads and Parking (Appendix C) and the TDP (Appendix D).

5.4 Mobilization and Site Preparation

Mobilization will be initiated by the Remediation Contractor after notification from the RA Respondents to proceed. In general, mobilization activities include bringing personnel, equipment, and materials to the Site to support the RA construction activities. Mobilization activities to be conducted by the Remediation Contractor each year (as necessary) include, but are not limited to, the following:

- Mobilizing and establishing three field office trailers: one to be utilized by the Remediation Contractor, one to be utilized by the Remediation Engineer, and one to be utilized by the USEPA during implementation of the RA. The trailers (and supporting telephone and internet services) will conform to the requirements to be presented in Specification Section 01 51 00, Temporary Utilities and Facilities.
- Coordinating with appropriate utilities to obtain electrical service and all necessary utilities for use during the RA construction at support areas for Phase 1 and Phase 2, in accordance with Specification Section 01 51 00, Temporary Utilities and Facilities.
- Providing and maintaining first-aid facilities and portable sanitary services for use by onsite personnel engaged in the RA. First-aid and portable sanitary services will conform to the requirements to be presented in Specification Section 01 51 00, Temporary Utilities and Facilities.
- Preparing and providing submittals (in addition to the pre-mobilization submittals) in accordance with Specification Section 01 33 00, Submittal Procedures, to Remediation Engineer and/or the RA Respondents for review as required by the Contract Documents (e.g., Design Drawings, Specifications, etc.). Select submittals may be provided to the USEPA for review and comment.

- Obtaining any additional permits not identified in Section 4.2. The Remediation Contractor will be responsible for obtaining local permits (e.g., city building and/or construction permits) necessary to facilitate the remediation activities.
- Performing site preparation activities for all areas, including:
  - Verifying site conditions and identifying, marking, and verifying the locations of aboveground and underground utilities, equipment, and existing structures and site features (e.g., manholes, outfalls, buildings), as necessary, to implement the RA and in accordance with Specification Section 01 76 00, Protecting Installed Construction. Current site conditions (i.e., a site plan and approximate locations of known existing utilities) are shown on the Design Drawings (Appendix B).
  - Coordinating with utility owners, subcontracting with a private utility locator, and contacting Dig Safely New York (Dig Safely) to initiate a subsurface utility clearance request, a minimum of three business days before the start of the RA, to identify and mark the locations of underground utilities (e.g., electricity, telecommunications, water, natural gas, and storm and sanitary sewer) and associated structures at and near the work areas, to be presented in Specification Section 01 76 00, Protecting Installed Construction. If the Remediation Contractor damages existing utilities, equipment, or structures, the Remediation Contractor will be responsible for notifying the utility company/municipality and fully repairing all damages at no additional cost to the RA Respondents. Repairs (if necessary) will be completed in accordance with all requirements of the utility company/ municipality.
  - Establishing temporary access roads and parking in accordance with Specification Section 01 55 00, Temporary Access Roads and Parking.
  - Completing pre-construction surveys and establishing survey control and work limits as noted in Section 5.1.
  - Installing structural monitoring points as discussed in Section 5.4.
  - Erecting project signs in accordance with Specification Section 01 58 13, Temporary Project Signage.
  - Installing temporary erosion, sediment, and turbidity controls in accordance with the Design Drawings and Specification Sections 01 57 00, Temporary Controls, and 01 41 26, SWPPP and Permit.
  - Installing temporary flood contingency measures, if needed based on weather and river conditions while temporary construction support facility(s)/structure(s) (e.g., river crossings) are in place. The assessment of the need for temporary flood contingency measures will be performed as the RD progresses.
  - Tree removal and grubbing activities in accordance with Specification Section 31 10 00, Site Clearing and Grubbing. Tree removal and grubbing beyond that required to support site preparation for soil and sediment removal activities are prohibited. Trees and shrubs will be removed only as necessary to complete the remedial construction activities and will be performed in accordance with permit requirements. The Remediation Contractor will not complete clearing and grubbing until a tree and vegetation survey is performed by the Remediation Engineer, in accordance with Section 4.3. Cleared vegetation, with the exception of invasive species, will either be disposed of locally, stockpiled for habitat reconstruction, or mulched and used onsite. Cleared invasive species vegetation will be handled separately and disposed of properly in order to prevent potential spreading of such invasive species.
  - Installing work zone air monitoring equipment (to be relocated, as appropriate, based on wind direction) as required by the Remediation Contractor's HASP.

- Installing site control and safety measures, including temporary site security fencing and gates and project/warning signs in accordance with Section 5.1.3.
- Performing general site preparation to support staging of office trailers and the TWTS and constructing/improving the foundation pads (e.g., for the TWTS).
- Constructing temporary remediation support areas including, but not limited to; impacted material staging areas; onsite storage areas (for clean materials); and equipment, material, and personnel decontamination areas. The locations proposed to be available for Remediation Contractor staging/support are shown on Design Drawings G-110, G-111, and G-114.[5] Remediation support area construction requirements will be detailed in the following Specification Sections:
  - 02 61 15, Handling and Disposal of Impacted Materials
  - 02 51 00, Decontamination
  - 31 05 05, Aggregates for Earthwork
  - 31 05 19.13, Geotextiles for Earthwork
  - 31 05 19.16, Geomembranes for Earthwork

  The Remediation Contractor will be responsible for maintaining the remediation support areas (including the integrity of the liner systems) as necessary during implementation of the remedial activities.

- Constructing and testing the TWTS and in accordance with Specification Section 01 53 53, Temporary Water Treatment and Management.

Refer to Design Drawings (Appendix B) and Specifications (Appendix C) for additional information regarding site preparation.

The Remediation Contractor will inspect and confirm the condition of installed facilities prior to the start of construction.

5.5 Construction Monitoring and Environmental Controls

Construction monitoring will be required during the RA construction activities to identify and address, if necessary, temporary impacts that may arise during construction activities. The Remediation Engineer and Remediation Contractor will share responsibilities for monitoring for impacts to workers and the surrounding community throughout the remedial construction. Plans to describe monitoring and control measures that will be implemented to protect human health and reduce environmental impacts during the RA are presented in this section.

The Remediation Engineer will be responsible for implementing the following:

- Air monitoring PM_{10} and VOCs) and sampling (PCBs)
- Water quality monitoring (turbidity) and sampling (PCBs)

[5] As discussed in Section 4.2.2, access to non-Respondent properties within the Subsite will be negotiated during pre-RA activities. The final location of areas available for the Remediation Contractor use will be confirmed with affected property owners.

The Remediation Contractor will be responsible for implementing the following:

- Worker breathing zone air monitoring (for the Remediation Contractor's employees)
- Structural survey and geotechnical monitoring
- General monitoring related to weather/surface water elevation, noise, and spills, as necessary.

The Remediation Contractor will also be responsible for implementing corrective actions in consultation with the Remediation Engineer and the RA Respondents in the event of an exceedance. Monitoring requirements, action levels and corrective actions are (or will be) detailed in attached specifications and plans as presented in the following subsections.

A BMP has been developed and appended to the RDWP (Arcadis 2021) to provide details on how baseline environmental conditions will be documented prior to construction (see Section 4.3). The SMP to be developed as the RD progresses will describe monitoring to be performed after completion of the RA.

5.5.1 Air Monitoring and Sampling

The Remediation Engineer will perform odor, vapor, and PM_{10} perimeter air monitoring and PCB air sampling during intrusive construction activities and submit routine reports to the RA Respondents, the Remediation Contractor, and USEPA. Vapor and PM_{10} monitoring and PCB sampling action levels, appropriate corrective actions, and reporting requirements will be presented in Specification Sections 01 35 49, Community Air Monitoring Plan, and 01 57 00, Temporary Controls (Appendix C). In the event of an exceedance of an air monitoring action level, the Remediation Engineer will notify the RA Respondents as soon as the exceedance is identified. The Remediation Engineer will send a follow-up e-mail to USEPA, the RA Respondents, and the Remediation Contractor within 48 hours of an exceedance that summarizes the data, the cause of the exceedance, and corrective measures implemented (or to be implemented) in response to the exceedance. Work will not continue until exceedances are addressed in consultation with the RA Respondents and the Remediation Contractor. Real time exceedances will be addressed immediately in consultation with the Remediation Contractor.

The Remediation Contractor will perform worker breathing zone air monitoring. Information regarding worker breathing zone monitoring will be included in the Remediation Contractor's HASP, submitted in accordance with Specification Section 01 35 29, Health, Safety, and Emergency Response Procedures.

The approach to air monitoring and sampling during removal activities and backfill/capping operations includes:

- Air quality requirements and measurement locations (Specification Section 01 35 49, Community Air Monitoring Plan), selected with consideration for potential off-site receptors
- Removal and material placement best management practices (Specification Sections 01 57 00, Temporary Controls, and 01 74 00, Cleaning and Construction Waste Management).

Construction components that are considered intrusive for the purposes of air monitoring and that have the potential to generate air emissions include, but may not be limited to, the following:

- Soil and sediment removal

- Material handling (e.g., onsite material handling for transport to the staging area, stockpiling of materials, manipulation of materials to render them suitable for offsite disposal, and loading of materials for transport to an offsite disposal facility)
- Backfilling and restoration of excavation and support areas (potential for PM_{10} emissions only; no VOC air monitoring or PCB air sampling is anticipated)
- Other ancillary intrusive activities during site preparation and site restoration (potential for PM_{10} emissions only; no VOC air monitoring or PCB air sampling is anticipated).

Real-time airborne monitoring for PM_{10} and total VOCs will be conducted continuously starting two days before (see Section 4.3) and continuing daily during intrusive and/or potential dust-generating activities (i.e., intrusive site preparation activities, removal, restoration, and material handling activities). After the first four weeks of dust-generating activities, if no exceedances of VOC monitoring levels are observed, monitoring for VOCs will be reduced to one day per week for three additional months. If no exceedances of VOC monitoring levels are observed in these first four months of monitoring, the RA Respondents will propose to USEPA to discontinue the real-time airborne monitoring for total VOCs.

Ambient air PCB monitoring will be conducted for one 24-hour period prior to initiation of any excavation and handling of impacted soil or sediment material (see Section 4.3). In addition, ambient air PCB monitoring will be conducted once per week for the first four weeks of soil or sediment removal and material handling activities at the Subsite and, if no exceedances of PCB sampling action levels are observed, reduced to once per month for three additional months. If no exceedances of PCB sampling action levels are observed in these first four months of sampling, the RA Respondents will propose to further reduce the frequency of or eliminate PCB sampling. As indicated above, ambient air PCB monitoring is not required during backfilling or restoration activities if no concurrent material removal activities are occurring. To the extent practicable based on construction sequencing, ambient air PCB sampling will be coordinated to align with removal of material from areas with known elevated PCB concentrations. Modifications to the sampling program may also be prompted by weather conditions or onsite construction activities.

As to be required by Specification Section 01 57 00, Temporary Controls, odor, vapor, and dust controls will be proactively employed by the Remediation Contractor during the work to:

- Prevent exceedances of the total VOCs, PM_{10}, or PCB action levels to be specified in Specification Section 01 35 49, Community Air Monitoring Plan.
- Mitigate construction-related odor emissions to the extent practicable and to the satisfaction of the RA Respondents, the Remediation Engineer, and USEPA.

Details of the best management practices to be implemented during construction to mitigate construction impacts to air quality will also be specified in Specification Section 01 57 00, Temporary Controls.

5.5.2 Turbidity Control and Surface Water Quality Monitoring

Best management practices will be used to minimize turbidity caused by construction-related activities. Such best management practices will include, but are not limited to, the following:

- A sequenced/phased construction approach
- Minimizing water infiltration into the active work area, to the extent practicable

- Onsite water management and treatment
- Landside erosion and sedimentation controls.

In addition to those practices, a turbidity (silt) curtain will be used during in-river construction work and potential disturbance activities to limit the migration of re-suspended sediment downstream of the work area. Prior to initiation of in-water construction activities, the turbidity curtain system will be installed within Ley Creek downstream of the active work area. The turbidity curtain system will be constructed in accordance with the performance standards to be indicated on Design Drawing G-502. The Remediation Contractor will maintain the turbidity curtains downstream of each of the sediment removal areas throughout sediment removal operations and until restoration is complete. Turbidity control will be based on the review of turbidity monitoring results (i.e., performance-based) and the RA Contractor will use turbidity curtains and work practices to achieve the monitoring standards to be provided in Specification Section 01 57 00, Temporary Controls.

In accordance with Specification Section 01 57 00, Temporary Controls, the Remediation Contractor will perform both qualitative and quantitative turbidity monitoring at two locations (for each remediation Phase) in Ley Creek, including one location upstream of the active work area and one location downstream of the active work area. Preliminary turbidity monitoring locations are detailed on Design Drawing C-101 and C-104 for Phase 1 and Design Drawings C-104 and C-108 for Phase 2. Final locations will be determined based on field conditions/accessibility and the need to maintain a safe distance from the active work area. During work hours, turbidity monitoring will consist of real-time turbidity monitoring stations at the locations upstream and downstream of the active work area and periodic qualitative visual monitoring. The Remediation Contractor will provide the Remediation Engineer and the RA Respondents with access to the real-time turbidity data.

The upstream location will represent the background turbidity level for comparison to the downstream location. Turbidity levels will be logged and transmitted a minimum of every 15 minutes. Based on a quantitative differential between the upstream and downstream monitoring locations and/or qualitative observation of contrast between the water quality upstream and downstream of the site, exceedance criteria and appropriate response actions have been established, as to be indicated in Specification Section 01 57 00, Temporary Controls. The early warning level is based on a quantitative differential of more than 25 but less than 50 nephelometric turbidity units (NTU), while the action level is based on a differential of more than 50 but less than 100 NTU. If a differential of more than 100 NTU is observed, work activities will be temporarily ceased.

5.5.3 Geotechnical Monitoring

The Remediation Contractor will be responsible for installing vibration (seismographs) and optical monitoring points and conducting associated monitoring before (see Section 4.3) and throughout the remedial construction. Geotechnical monitoring will consist of vibration and optical survey monitoring of structures immediately adjacent to excavation areas. The locations at which optical survey points and vibration monitoring equipment will be installed will be developed as the RD progresses and with consideration for minimum offset distances. Details for geotechnical instrumentation, installation, and monitoring (including notification and action levels) will be presented in Specification Section 31 09 13, Geotechnical Instrumentation and Monitoring.

5.5.4 Weather/Water Level Monitoring

The Remediation Contractor will install staff gauges (or equivalent) upstream of the work area to facilitate monitoring of water elevations during in-water operations. The Remediation Contractor will conduct weather and

water level monitoring, and implement response actions (e.g., evacuation of personnel and equipment from the creek) as necessary and as indicated in the ERP (Arcadis 2016), which is anticipated to be revised and resubmitted as the RD progresses (see Section 1.5).

5.5.5 Noise

The Remediation Contractor will be responsible for minimizing noise emissions caused by construction operations, to the extent practical, and complying with all applicable laws and local ordinances.

5.5.6 Spills

The Remediation Engineer will be responsible for reporting issues related to unanticipated environmental impacts and the Remediation Contractor will be responsible for reporting spills (e.g., due to equipment leaks). Spill response actions to be implemented by the Remediation Contractor are detailed in the ERP (Arcadis 2016), which is anticipated to be revised and resubmitted as the RD progresses (see Section 1.5).

5.6 Soil and Sediment Removal

The Remediation Contractor will remove soil and sediment to the limits shown on Design Drawings C-101 through C-104 (Phase 1) and Design Drawings C-105 through C-108 (Phase 2) over two construction seasons. In general, excavations will be sequenced such that upstream areas are remediated and backfilled first followed by the downstream areas.

It is anticipated that mechanical removal methods (e.g., excavators, articulating dump trucks/track trucks) will be employed for soil and sediment removal areas of the Subsite, and that sediment removal will be performed in the wet with temporary turbidity controls. To the extent practicable, removed materials will be directly loaded into sealed vehicles for transport to temporary staging areas for stockpiling and management (e.g., dewatering) prior to offsite transport and disposal (as discussed in Section 5.8.1) – unless they can be transported directly to such an offsite facility. The areas proposed to be available for contractor temporary staging areas are shown on Design Drawings G-110 and G-111 (Phase 1) and G-114 (Phase 2).

Saturated materials will be allowed to drain within the excavation limits (i.e., from the excavator bucket suspended over the excavation area) prior to being directly loaded into sealed vehicles for transport. If the excavated materials are not sufficiently dewatered by such draining for onsite transport, an alternate method will be utilized to allow time for gravity dewatering prior to being loaded for transport to the temporary staging area. Such methods may include placing the saturated materials on dry areas subject to subsequent excavation (or other dry areas if necessary), construction and use of a lined and contained dewatering pad, use of a roll-off container, and/or another equivalent method. If temporary staging is necessary for such dewatering, the temporary staging areas will meet the applicable requirements for a temporary staging area as described in Section 5.4.

Sediment and soil will be removed simultaneously by multiple teams working concurrently, generally working from upstream to downstream and minimizing the potential for cross-contamination of the remediated areas. For sediment removal and restoration, equipment may be positioned on the access roads constructed at the top of the creek bank (anticipated for Phase 1) or positioned on barge(s) within the creek (anticipated for Phase 2). Final means and methods will be based on the Remediation Contractor's discretion and presented in the Contractor's POP.

Although initial field reconnaissance performed during PDI activities noted some areas of debris in Ley Creek and multiple areas of rubble and/or rubbish in upland areas, it is anticipated the debris is small enough not to require pre-removal, and instead will be removed using conventional equipment with the surrounding sediment.

Allowable over-excavation and over-dredge depths will be developed as the RD progresses and specified in Specification Sections 31 23 16, Soil Excavation, and 35 24 00, Dredging.

Backfilling operations will be initiated as soon as practicable after completion and proper documentation of removal activities and, in certain areas, after post-removal sampling results have been reviewed and confirm removal is complete. Positioning system technology on the removal equipment will be used to document and confirm that removal activities have achieved the required limits shown on the design drawings.

5.7 Post-Removal Sampling

Post-removal sampling will be performed in select areas where the removal limits are not defined (either horizontally or vertically) by sample locations with results less than the cleanup goals. Removal limits may be defined, either directly based on proximity of a sample location with results less than the cleanup goals or indirectly based on topography and nearby sample locations at the same elevation with results less than the cleanup goals. The need for and preliminary frequency/location of post-removal sampling for select removal areas identified in the RDWP is summarized in Table 5-2.

Table 5-2. Preliminary Post-Removal Sampling Approach

Removal Area(s)	Removal Limit(s) not Defined	Proposed Approach[1,2]
SED-J7 (8-foot removal)	Vertical	Collect one post-removal sediment core between PDI locations SED-J-004R and SED-J-004C.
SED-L1 (8-foot removal)	Vertical	Collect one post-removal sediment core at PDI location SED-L-003/-003A.
SED-G4 (10-foot removal)	Vertical	Collect one post-removal sediment core at PDI location SED-G-002L.
SED-F8 (7-foot removal)	Vertical	Collect one post-removal sediment core between PDI locations SED-F-003L and SED-F-003C.
SOIL-J1 (2-foot removal)	Vertical	Collect one post-removal soil core in between historical sample locations SS/SB-17 and SS/SB-18.
SOIL-I2 (3-foot removal)	Horizontal	Collect one mid-depth sidewall soil core along the southern edge of the removal polygon.
SOIL-I3 (5-foot removal)	Vertical Horizontal	Collect one soil core in the center of the removal polygon for vertical definition and collect one mid-depth sidewall soil core south of PDI location SOIL-I-018 for horizontal definition.
SOIL-H (2-foot removal)	Horizontal	Collect one mid-depth sidewall soil core along the southern edge of the removal polygon, approximately halfway between PDI locations SOIL-H-013 and SOIL-H-013-STEP.
SOIL-H1 (2-foot removal)	Horizontal	Collect one mid-depth sidewall soil core southwest of PDI location SOIL-H-019.
SOIL-D (2-foot removal)	Horizontal	Collect one mid-depth sidewall soil core along the southwestern edge of the removal polygon, adjacent to Bear Trap Creek.
SOIL-R1, SOIL-R2, SOIL-R3, and SOIL-R4 (2-foot removals)	Horizontal	Based on the PDI sample concentrations for (ranging from non-detect [ND] to 4.9 mg/kg) and between (ranging from ND to 0.9 mg/kg) the SOIL-R1 through SOIL-R4 removal areas, and utilization of the industry-standard approach of drawing Thiessen polygons to define removal boundaries, no post-removal samples are proposed at these locations.

Note:
1. All post-removal samples will be collected after the target removal extent has been achieved.
2. All post-removal samples will be collected by the Remediation Engineer. Cores will target 2 feet of recovery and be processed into 1-foot intervals. The 0- to 1-foot interval will be submitted for laboratory analysis of PCBs on a rush turnaround time. The 1- to 2-foot interval will be submitted to the laboratory for archiving and potential analysis based on the results from the 0- to 1-foot interval.

The proposed locations for post-removal sampling are illustrated on Design Drawings C-101, C-102, and C-104. For all locations, the removal polygon will not be backfilled until the post-removal sample result is returned. If the results indicate PCBs less than the cleanup goals, no additional removal will be required in the area represented by the post-removal sample. However, if results indicated PCBs greater than the cleanup goal, USEPA and the RA Respondents will discuss and define the extent and depth of additional removal.

5.8 Handling, Dewatering, and Management of Impacted Material

Removed soil and sediment will be transported to a temporary staging area(s) and then dewatered and stabilized prior to final transportation and disposal at the selected LDF and/or non-local facility. In addition, the water collected during the dewatering process will require treatment at a TWTS prior to discharge to the local sewer or to Ley Creek, as appropriate based on permit requirements. The areas proposed to be available for contractor temporary staging areas are shown on Design Drawings G-110 and G-111 (Phase 1) and G-114 (Phase 2).

This section describes the various material handling, dewatering, and management activities associated with the removed materials and associated wastes (e.g., decontamination water, personal protective equipment) expected to be generated during the removal action. In general, wastes generated during the remedial activities will be handled and disposed of/treated in accordance with applicable federal, state, and local regulations, as well as Specification Section 02 61 15, Handling and Disposal of Impacted Materials.

5.8.1 Onsite Transport

During the performance of RA activities, excavated and import materials will be transported back and forth between the active removal area(s) and the upland temporary staging area(s) established by the Remediation Contractor. The transportation of any materials between these locations will occur "onsite". Onsite material handling and management activities will be performed in a manner that minimizes the potential for inadvertent releases to the environment and/or unsafe conditions for on and offsite personnel. Onsite haul routes will be visually inspected daily to ensure no removed material (or other foreign material) has been inadvertently deposited.

If the Remediation Contractor elects to utilize public roads for transport between removal area(s) and the upland staging area(s), the Remediation Contractor will be required to follow the rules and regulations specific to hauling potentially hazardous material over public roadways. At a minimum, the removed material will be loaded into a lined truck with a sealed gate, which must not show signs of leaking, and would be transported using an appropriate Materials BOL. If the tires of the truck to be used for transport come into contact with the removal area, the tires will be cleaned as to be indicated in Specification Section 02 51 00, Decontamination, before traveling to a public road. The United States Department of Transportation (DOT) shipping description to be used on the BOL will be "RQ, Polychlorinated biphenyls, mixture, 9, UN 2315, PG 111, RQ." The transporter will need to be a qualified person trained per DOT requirements for handling and shipping hazardous materials and be a New York-permitted waste hauler, consistent with New York Codes, Rules, and Regulations Part 364 (NYSDEC 2016).

5.8.2 Soils, Sediment, and Debris Handling and Management

Materials removed will be transported to the staging area (see Section 5.8.1), temporarily stockpiled, and managed (e.g., dewatered) prior to disposal at the LDF or offsite transport and disposal. Removed soil, sediments, and debris will be excavated and transported separately based on whether they are TSCA-regulated or non-TSCA-regulated materials (as noted in Section 2.5) and segregated into separate stockpiles. Boulders greater than 2 feet in diameter will be separated and stockpiled for cleaning via pressure washer, as necessary, and staged for reuse as creek backfill (e.g., channel enhancement for fish habitat) during backfilling/restoration

activities. The impacted material staging area includes provisions for wash water collection (to support conveyance to the TWTS).

At the staging area, material will be gravity dewatered, and if necessary and appropriate, will be blended with a drying agent (e.g., Portland cement, cement kiln dust, other suitable and locally available material), as necessary, to pass the USEPA's "Paint Filter Test" and the requirements of the selected disposal facility. All dewatering activities will be conducted within a designated area constructed and lined as to be indicated on Design Drawing G-503. At the end of each work day, materials present within the staging area will be covered and will be loaded out as soon as possible.

If necessary, for non-TSCA materials, if the gravity dewatering procedure does not yield material that will pass the Paint Filter Test, drier excavated materials (if available in sufficient quantities) or drying agents will be mixed with the stockpiled material (as necessary) in the temporary staging area to condition the material such that it is suitable for transport (i.e., contains no free liquids and passes the Paint Filter Test). For TSCA-regulated material to be landfilled, the Remediation Contractor will take other actions (including, but not limited to, combining excavated TSCA-regulated materials that have a high moisture content with excavated TSCA-regulated soils that have a lower moisture content, if practicable) as necessary to allow the material to pass the Paint Filter Test prior to adding drying agents. Once such material passes the Paint Filter Test, polymer or other drying agents may be added to further "dry" the excavated material so as to facilitate transport to offsite disposal facilities.

The Remediation Contractor will make all reasonable attempts to reduce the need for drying agents, such as blending drier material with other material that is more saturated. It is anticipated that solidification agents, if any, will be mixed at less than 10 percent by volume with the removed material to make it suitable for transport for disposal. The Remediation Contractor may elect to perform a treatability test to support selection of the optimal drying agent and dosage rate prior to construction and/or modifying the drying agent and dosage rate during construction based on Paint Filter Tests.

All trucks transporting material offsite will be lined and be equipped with a sealed tailgate.

As discussed in Section 2.5, based on existing sample data the removed material is currently classified as either TSCA or non-TSCA solid waste. If additional characterization is required by the selected disposal facility(ies), a sample will be collected from the onsite stockpile(s) and the material will be characterized. The disposal facilities for excavated soil, sediment, and impacted debris will be selected and/or approved by the RA Respondents. Removed debris free of visible impacts (e.g., brick and concrete) will be disposed of at an appropriate facility selected by the RA Respondents.

5.8.3 Water Handling and Management

The Remediation Contractor will be required to remove, treat, and discharge water generated from material dewatering and equipment, material, and personnel decontamination activities. It is anticipated the Remediation Contractor will treat the liquid waste onsite and will discharge treated water to the local sewer or back to Ley Creek, as appropriate based on permit requirements. The Remediation Contractor will be responsible for the setup and operation of a TWTS, as well as any system performance sampling. The Remediation Engineer or Remediation Contractor will be responsible for conducting sampling required (if any) to treated water is within established limits for discharge.

Prior to initiating excavation operations, a TWTS will be constructed at the areas proposed to be available for contractor support/laydown shown on Design Drawings G-110 and G-111 (Phase 1) and G-114 (Phase 2).

Minimum requirements for TWTS components and treatment standards will be provided in Specification Section 01 53 53, Temporary Water Treatment and Management. Water generated from the gravity dewatering of the excavated material and decontamination activities will be collected and conveyed to the TWTS for treatment.

The TWTS will be designed to remove suspended solids and PCBs from the water; and other constituents (e.g., oil and grease, insoluble metals) as required by the local municipality or SPDES Permit Equivalent. As presented in the ROD, if water that is drained from the impacted material is discharged to surface waters, then it will be treated to meet NYSDEC discharge requirements (i.e., SPDES Permit Equivalent); such requirements will be developed in consultation with USEPA to meet the substantive requirements of the state Water Quality Certification under Section 401 of the Federal Water Pollution Control Act (USEPA 2020), which were clarified in the Clean Water Act Section 401 Certification Rule.

The Remediation Contractor will be responsible for the setup and operation of the temporary TWTS and achieving the discharge criteria specified in the SPDES Permit Equivalent for discharge back to Ley Creek or as specified by the local municipality for discharge to the local sewer (either to be obtained by the Design Engineer prior to commencing remedial construction activities). The Remediation Contractor will be required to conduct system start-up testing in accordance with Specification Section 01 53 53, Temporary Water Treatment and Management, and for conducting water quality sampling required under the Permit Equivalent for discharge to Ley Creek or by the local municipality for discharge to the local sewer. Requirements for temporary TWTS components will be provided in Specification Section 01 53 53, Temporary Water Treatment and Management. Residuals from the TWTS (i.e., settled solids, expended filter bags, granular activated carbon media, and organoclay) will be handled and disposed of with the excavated material.

5.9 Final Transport and Disposal of Impacted Material

Following material handling and processing, certain waste material types will require transportation and disposal as indicated below:

- Materials containing PCB concentrations greater than or equal to 50 mg/kg will be transported to an offsite TSCA-compliant facility.
- Materials that are not TSCA-regulated (i.e., PCB concentrations less than 50 mg/kg) and are not characteristic hazardous waste will be transported to an LDF, if available and feasible. The LDF will be identified as noted below.

As discussed in Section 2.5, no waste characterization sample results exceeded TCLP limits, and as such, no material is determined to be a characteristic hazardous waste requiring transport to an offsite RCRA-compliant facility.

In accordance with the AOC, a Local Disposal Assessment was performed to determine the potential feasibility of two local landfills for the final disposal of materials that are neither TSCA- or RCRA-regulated (Arcadis 2016). The assessment concluded that both local landfill sites are feasible options for the disposal of non-regulated material, and USEPA concurrence on the Local Disposal Assessment is anticipated before submittal of the Intermediate RD. In anticipation of USEPA concurrence, the RD Respondents have initiated communication with the owner(s) and/or operator(s) of the chosen disposal facility(ies) to work towards an executed agreement which will state that the to-be excavated waste will be accepted in accordance with applicable requirements. Although the RD Respondents have initiated communications and negotiations with the owner(s) and/or operator(s) and have undertaken best efforts to work toward the execution of a Local Disposal Agreement(s), without USEPA

concurrence on the Local Disposal Assessment, and due in part to the lengthy review and approval periods required of the municipalities, an executed Local Disposal Agreement(s) is not yet secured. It is anticipated the executed Local Disposal Agreement will be provided to USEPA at the Intermediate RD stage in the design process.

5.10 Capping

It is anticipated that mechanical placement methods (e.g., excavators) will be employed for cap placement in the designated areas. The excavator would place dry materials that are staged in a nearby area or dump truck. For in-water application, the excavator operator would lower the bucket to near the water surface and would slowly tip the bucket to place thin lifts, feathered along the extent of the bucket arm's reach. Additional techniques may be considered as the designated cap areas are defined as the RD progresses and/or in consultation with the selected Remediation Contractor.

5.11 Backfill and Habitat Restoration

As discussed in Section 2.7, backfill grades will be developed in the form of elevation contours as the RD progresses to illustrate the design backfill extent. In general, following the completion of excavation activities, the soil removal areas will be backfilled and restored to match pre-construction elevations, except where backfill may not be to grade to increase flood storage capacity in the floodplain impacted by SOIL-E, -H, -I, -I1, -I2, and -I3. For sediment areas at least one foot of substrate similar to the existing sediments will be placed over disturbed sediment areas. In removal areas where there is underlying municipal refuse, a readily visible and permeable subsurface demarcation layer delineating the interface between the refuse/native soil and the clean soil cover will be installed prior to placement of backfill material.

The Remediation Contractor will propose backfill materials from sources meeting the requirements to be specified in Specification Section 31 05 16, Aggregates for Earthwork. The Remediation Engineer or Remediation Contractor will be responsible for conducting analytical and geotechnical testing to verify that the proposed materials meet project specifications. The Remediation Engineer will provide USEPA with testing results. Removal areas will be backfilled in accordance with the requirements to be presented in Specification Sections 31 23 23, Soil Backfill and Caping, and 35 43 00, Sediment Backfill and Capping.

It is anticipated that mechanical placement methods (e.g., excavators) will be employed for backfill placement. In general, backfill material will be placed after removal of all material from a designated removal polygon has been completed (as confirmed via global positioning on the equipment). The specific sequencing of removal and backfill activities will be determined by the selected Remediation Contactor. In removal areas near CSX-owned railroad, specific removal and backfilling sequencing will be further evaluated as the RD progresses.

Cross sections representing the typical restoration components are illustrated on Design Drawings C-501 through C-503, and the associated details are provided on Design Drawings C-504 through C-506. Additional restoration requirements will be presented in the following Specification Sections:

- 31 05 16, Aggregate for Earthwork
- 31 23 23, Soil Backfill and Capping
- 32 90 00, Plantings and Restoration

- 35 43 00, Sediment Backfill and Capping.

Final placement of plantings may be varied in the field based on site conditions and under the direction of the Remediation Engineer's ecologist.

In addition, areas beyond the design removal and backfill limits that require disturbance will be restored to match pre-construction elevations and in a similar manner, based on elevation, as specified on Design Drawings C-501 through C-503.

See the Habitat Restoration Plan (Appendix A) for additional details related to backfill and habitat restoration.

5.12 Project Closeout

This section presents the project close-out activities to be completed by the Remediation Contactor.

5.12.1 Decontamination

The Remediation Contractor will decontaminate (as necessary), within the constructed decontamination area of the temporary staging area, all personnel and equipment, and vehicles that come into contact with excavated materials. The areas proposed to be available for contractor temporary staging areas are shown on Design Drawings G-110 and G-111 (Phase 1) and G-114 (Phase 2). All construction vehicles leaving the Site (including vehicles that had been transporting clean fill) will be cleaned and/or decontaminated by the Remediation Contractor (as necessary) to prevent the tracking of soil offsite.

At a minimum, the Remediation Contractor will decontaminate the Remediation Contractor's project equipment that comes in contact with removed soil or sediment materials (including, but not limited to, material removal, transport, and blending equipment, trucks, liquid handling equipment, pumps, and hand tools) prior to demobilizing and prior to handling clean material in accordance with Specification Section 02 51 00, Decontamination. The Remediation Contractor will perform decontamination activities until no visible soil, sediment, debris, or stains are present on the equipment surfaces. Equipment, such as pumps, will be flushed using clean water and appropriate cleaning agents (as necessary) to the satisfaction of the Remediation Engineer.

Unless otherwise directed by the RA Respondents and/or the Remediation Engineer, any equipment to be removed from the Site by the Remediation Contractor will be subject to a final visual inspection by the RA Respondents, the Remediation Engineer, and/or USEPA following cleaning. Precautions will be taken to limit contact between the equipment, personnel performing the cleaning activities, and any cleaning liquids that may accumulate in the decontamination area. The decontamination/wash area includes provisions for wash water collection (to support conveyance to the TWTS), and any water generated during decontamination activities will be treated in accordance with Specification Section 01 53 53, Temporary Water Treatment and Management.

5.12.2 Post-Construction Structural Survey

The post-construction structural surveys will be conducted by the same third-party engineering firm that conducted the pre-construction structural surveys. The post-construction structural survey will be conducted consistent with the pre-construction structural surveys and include, but not be limited to, visual inspection and photographic documentation of the subject structures, in accordance with Specification Section 02 21 19,

Structural Surveys. A post-construction structural survey report will be submitted to the RA Respondents and the Remediation Engineer within two weeks following the inspection.

5.12.3 Post-Construction Photographic Survey

The Remediation Contractor will conduct photographic surveys of all temporary support/access areas or affected properties, used during construction activities in accordance with Specification Section 01 71 23.16, Construction Surveying. Photographic surveys will be conducted as part of post-construction activities (following restoration/demobilization) and compared to the pre-construction photographic survey.

5.12.4 Demobilization

As this project is anticipated to be performed over two construction seasons, the Remediation Contractor will temporarily demobilize from the Site following completion of Phase 1 work and fully demobilize from the Site following completion of Phase 2 work. Following completion of remedial construction activities at the end of each season, the Remediation Contractor will conduct the following demobilization activities in accordance with Specification Sections 01 74 00, Cleaning and Construction Waste Management, and 01 77 00, Closeout Procedures for either temporary or final demobilization:

- Complete "punch list" items, to be identified by the Remediation Engineer and the RA Respondents.
- Remove the temporary turbidity control system and any other work area(s), support area(s), staging area(s), decontamination area, equipment, or material installed or staged outside of the contractor support/laydown area.
- Remove and dispose all impacted materials from the material stockpile areas including the decontamination/wash area.
- For each contractor support/laydown area, dismantle the work area(s), temporary import or impacted material staging area(s), and decontamination area specific to that phase of work, if not to be used in a subsequent season. If work area(s), staging area(s), and other support areas are to be used in subsequent seasons, the Remediation Contractor will ensure they are left in a clean, neat, stable, and orderly condition.
- Remove specified erosion and sediment control measures, as presented under Section 5.5, when the RA construction activities are completed, and vegetation is established with a minimum 80 percent density.
- Transport residual wastes (e.g., disposable equipment; personal protective equipment; sampling equipment; cleaning residuals; sacrificial soil and liners from the material staging, and equipment decontamination areas) remaining at the completion of the remedial activities for offsite disposal in accordance with applicable rules and regulations.
- Remove/dispose of project-related material, equipment, and support structures from the project area, as appropriate based on the work remaining to be completed the following season.
- Prepare and provide required final field records and submittals to the Remediation Engineer.

Upon completion of all RA at the Subsite, the Remediation Contractor will also appropriately remove/dispose all equipment and support structures from the Site, unless owned by the RA Respondents. For those materials and support structures owned by the RA Respondents, the Remediation Contractor will ensure they are left in a clean, neat, stable, and orderly condition, unless otherwise requested by the RA Respondents.

6 Post-Remediation Activities

The RA SOW for the Onondaga Lake Superfund Site, OU 25 – Lower Ley Creek is currently being drafted by USEPA, with input from the RD Respondents. The post-remediation reporting requirements (and document titles) will be finalized therein; however, it is anticipated post-remediation deliverables will include, at a minimum, a document presenting the final as-built conditions (i.e., RA Report) and a document presenting the anticipated post-remediation monitoring, controls, and maintenance activities (i.e., SMP). The anticipated information to be included in each report is summarized below.

6.1 Remedial Action Report

The Remediation Engineer will prepare and submit an RA Report to the USEPA following completion of RA activities at the Subsite. It is anticipated the RA Report will present the following information:

- Description of the RA activities, including variations, if any, from the USEPA-approved Final RD.
- Record ("as-built") drawings, tables, and figures detailing the removal action activities completed and indicating that acceptance criteria were met.
- Information and documentation regarding the final quantities and disposition of materials disposed/treated offsite during implementation of the removal action activities, including executed manifests and BOLs.
- Summaries of field observations, tests performed, laboratory samples collected, and monitoring results obtained during construction (e.g., water quality and air monitoring).
- Summaries of problems and deficiencies encountered during construction, including recurring problems and/or deficiencies discovered.
- Representative photographs taken during implementation of the removal action activities.
- Copies of regulatory permits, if required, and other key regulatory agency correspondence related to the permits and permit compliance.
- Certification statement.

The RA Report will document the removal action activities performed for the Subsite. A Professional Engineer licensed in New York State will sign and seal the RA Report, including the record drawings and certification statement.

6.2 Site Management Plan

A draft SMP will be included in the Pre-Final RD to present the methods and protocols to be followed when conducting post-construction monitoring, and will include the recommended scope, frequency, and duration requirements for post-construction monitoring. Following completion of the removal action activities, monitoring will be conducted to evaluate/monitor the restored removal areas, as well as restored upland staging and access area(s).

The SMP will also include:

- A summary of previous investigations and RA at the Subsite, including supporting tables and figures.

- A description of any institutional and engineering controls for the Subsite, including supporting tables and figures.
- Procedures to confirm that the engineering controls and institutional controls, if any, are in place and effective.
- Provisions for the management of future excavations in Subsite areas after the remedial construction work is completed (e.g., to address how excavated soils will be managed in the event of future maintenance/repair activities of the pipelines and in areas where municipal refuse was disposed).

Prior to the completion of the removal action activities, the SMP will be revised by the Remediation Engineer and resubmitted as necessary to incorporate comments from the USEPA or based on conditions observed in the field during construction.

7 Schedule

As described in the RD SOW, the Intermediate RD is scheduled to be submitted to USEPA within 60 days after USEPA comments on the Preliminary RD. The schedule for the Intermediate RD and subsequent RD deliverables is summarized below.

- Intermediate RD – Scheduled to be submitted 60 days after USEPA comments on the Preliminary RD.
- Pre-Final RD – Scheduled to be submitted 60 days after USEPA comments on the Intermediate RD.
- Final RD – Scheduled to be submitted 60 days after USEPA comments on the Pre-Final RD.

Note that, based on the progress of the ongoing remediation of Operable Unit 2 of the GM-IFG Operable Unit of the Onondaga Lake Superfund Site (GM-IFG OU2), certain portions of the RD activities described herein may be delayed. Specifically, based on the potential for changes in surface sediment conditions, and especially if there are overtopping conditions or releases to the Subsite over the duration of GM-IFG OU2 construction, additional pre-removal sampling of surficial sediment and/or additional survey activities may be warranted at the Subsite to confirm surface sediment conditions prior to implementation of the RA. Whether the need for additional sampling (or resurvey) of the Subsite sediments is warranted will be assessed following completion of the GM-IFG OU2 remedial activities and based on review of releases, if any, noted during implementation of the GM-IFG OU2 remedial activities. If additional sampling or other investigations are deemed appropriate, then the RD Respondents will work with USEPA to sequence timing of such work. Regardless, the implementation of remedial construction activities in Lower Ley Creek will not be initiated until remedial construction activities are complete in GM-IFG OU2.

Periodic meetings will be scheduled to discuss the status of ongoing efforts, upcoming events, and deliverables to resolve any issues that may arise during development of the RD. The Remediation Contractor procurement process for implementation of the RA will not likely occur until after USEPA approval of the Final RD; however, the approach for contracting, construction, and operation and maintenance of the RA will be further developed in the forthcoming RD deliverables and may be subject to change based on the Potentially Responsible Party Group participants at the time of implementation.

8 References

Arcadis. 2016. Pre-Design Investigation Work Plan – Lower Ley Creek Sub-site of the Onondaga Lake Superfund Site. December.

Arcadis. 2020. Pre-Design Investigation Data Summary Report (Revised) – Lower Ley Creek Subsite, Operable Unit 25 of the Onondaga Lake Superfund Site, City of Syracuse/Town of Salina, Onondaga County, New York. December.

Arcadis 2021. Remedial Design Work Plan – Lower Ley Creek Subsite Operable Unit 25 of the Onondaga Lake Superfund Site, City of Syracuse/Town of Salina, Onondaga County, New York. September 3.

Clough, Harbour & Associates LLP. 2013. Letter Report on Western Drainage Swale Remediation – Former Town of Salina Landfill, Salina NY. January.

HydroGeologic, Inc. 2014. Final Feasibility Study Report: Lower Ley Creek, Sub-site of the Onondaga Lake Superfund Site, Syracuse, New York. March.

Los Alamos Technical Associates, Inc. 2013. Final Remedial Investigation Report – Lower Ley Creak Subsite of the Onondaga Lake Superfund Site, Syracuse, New York. June.

New York State Department of Transportation. 2008. Standard Specifications (US Customary). State of New York Department of Transportation. Available online at: https://www.dot.ny.gov/main/business-center/engineering/specifications/2008-standard-specs-us.

NYSDEC. 2006. 6 NYCRR Part 375 – Environmental Remediation Programs, Subparts 375-1 to 375-4 & 375-6. December 14.

NYSDEC. 2010. DER-10 Technical Guidance for Site Investigation and Remediation.

NYSDEC. 2014. Screening and Assessment of Contaminated Sediment. New York State Department of Environmental Conservation Division of Fish, Wildlife and Marine Resources Bureau of Habitat. June 24.

NYSDEC. 2016. New York State Standards and Specifications for Erosion and Sediment Control. November.

NYSDEC. 2021. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs. June.

USEPA. 1995. Remedial Design/Remedial Action Handbook. EPA 540/R-95/059. June.

USEPA. 2009. EPA Principles for Greener Cleanups. August 27. Available online at: https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups.

USEPA. 2014. Record of Decision. Lower Ley Creek Sub-site of the Onondaga Lake Superfund Site, City of Syracuse/Town of Onondaga County, New York. September.

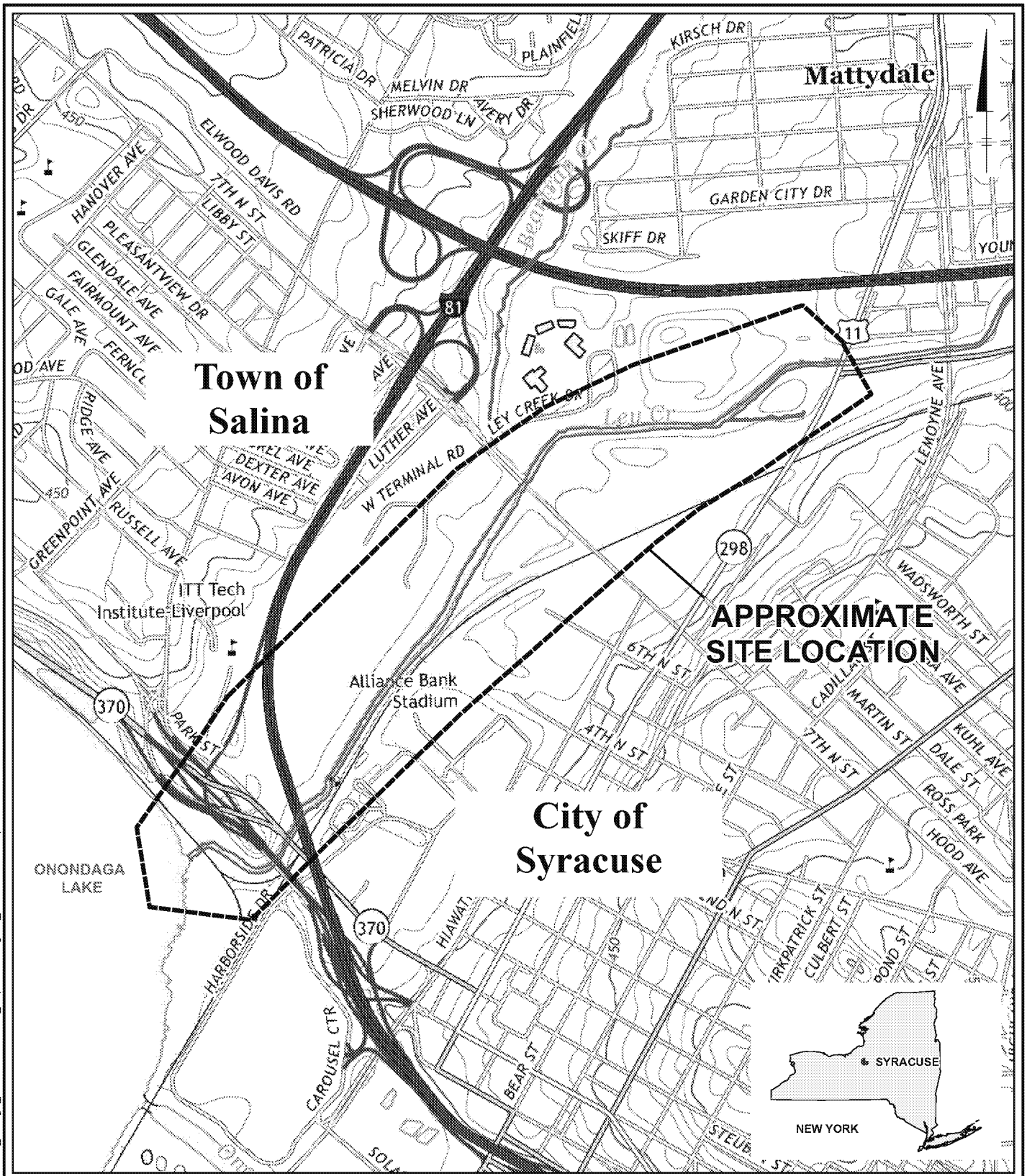
USEPA. 2016. Remedial Design Statement of Work – Onondaga Lake Superfund Site, Operable Unit 25 – Lower Ley Creek. July.

USEPA. 2020. Clean Water Act Section 401: State Certification of Water Quality. Issued June 1, 2020. Effective September 11, 2020.

USGS. 2021a. USGS 04240120 Ley Creek at Park Street, Syracuse New York. Available online at: https://nwis.waterdata.usgs.gov/nwis/inventory/?site_no=04240120&agency_cd=USGS. Accessed October.

USGS. 2021b. The StreamStats program. Available online at: http://streamstats.usgs.gov. Accessed October.

Figures



0 1,500 3,000 Feet

GRAPHIC SCALE

NOTE:

1. 2013 SYRACUSE WEST TOPOGRAPHIC QUADRANGLE OBTAINED FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS) AT: http://store.usgs.gov.

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SITE LOCATION MAP

ARCADIS

FIGURE
1-1

City: SYR Div/Group: IM/DV Created By: J.RAPP Last Saved By: ldrum
LOWER LEY CREEK (B0035101.0001.00001)
T:_ENV\LowerLeyCreekGroup\SyracuseNY\Remedial_Design_WP\MXD\Prelim_30percent\Fig1-1_SiteLocationMap.mxd 10/7/2021 8:51:15 AM

SALINA

SYRACUSE

APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL

APPROXIMATE LOCATION OF FORMER CITY OF SYRACUSE LANDFILL AREA

APPROXIMATE LOCATION OF CLOSED CROUSE HINDS LANDFILL (NORTH)

APPROXIMATE LOCATION OF CLOSED CROUSE HINDS LANDFILL (SOUTH)

APPROXIMATE LOCATION OF FORMER CITY OF SYRACUSE LANDFILL AREA

APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL

OLD LEY CREEK SITE

7TH NORTH STREET BRIDGE

INTERSTATE 81 BRIDGE

STATE ROUTE 11 BRIDGE

LEY CREEK

ONONDAGA LAKE

CSX RAILROAD

I-90

I-81

a

b

c

d

e

f

g

h

i

j

LEGEND:

- RAILROAD
- PIPELINE
- CREEK SHORELINE (APPROXIMATE)
- APPROXIMATE EXTENT OF LOWER LEY CREEK SUBSITE AND ADJACENT UPLAND SOIL AREAS
- APPROXIMATE LOCATION OF FORMER CITY OF SYRACUSE LANDFILL AREA
- APPROXIMATE LOCATION OF CLOSED CROUSE HINDS LANDFILL
- APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL
- APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL - PARCEL 6 EXCAVATION LIMITS
- APPROXIMATE AREA OF PREVIOUS WESTERN DRAINAGE SWALE CONSTRUCTION
- APPROXIMATE FORMER SWALE AREA
- APPROXIMATE BOARDER BETWEEN TOWN OF SALINA AND CITY OF SYRACUSE
- a FIGURE INDEX ID (SEE NOTE 5)

0 700 1,400 Feet

GRAPHIC SCALE

NOTES:

1. 2020 AERIAL IMAGERY OBTAINED FROM ESRI WORLD IMAGERY BASEMAP.
2. LANDFILL DATA LAYERS AND CREEK SHORELINE LAYERS OBTAINED FROM A GEODATABASE PROVIDED BY GZA/PALMERTON IN JUNE 2015.
3. RAILROAD DATA LAYERS WERE OBTAINED FROM ELECTRONIC FILES PROVIDED BY HYDROGEOLOGIC, INC. IN JULY 2015.
4. PIPELINE DATA LAYER PROVIDED IN 2017 BY THEW AND ASSOCIATES OF CANTON, NEW YORK.
5. FIGURE INDEX ID APPLIES TO FIGURES 1-3a THROUGH 1-3j

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SITE LAYOUT

ARCADIS

FIGURE
1-2

City: SYR Div/Group: IM/DV Created By: JRAPP Last Saved By: ldrum
LOWER LEY CREEK (B0035101.0001.00001)
T:_ENV\LowerLeyCreekGroup\SyracuseNY\Remedial_Design_WP\MXD\Prelim_30percent\Fig1-2_LowerLeyCreek_SiteLayout.mxd 10/21/2021 12:59:06 PM

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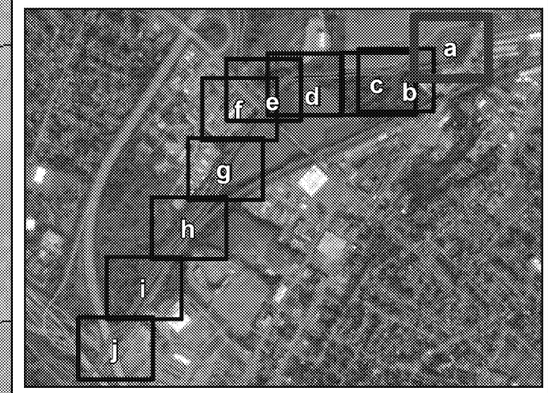
LEGEND:

- 2019 SOIL SAMPLE LOCATION
- 2017 OR 2018 SOIL SAMPLE LOCATION
- 2017 OR 2018 SEDIMENT SAMPLE LOCATION
- HISTORICAL SOIL SAMPLE LOCATION
- HISTORICAL SEDIMENT SAMPLE LOCATION
- SAMPLE LOCATION EXCEEDS PCB CONCENTRATION OF 50 MG/KG
- SAMPLE LOCATION EXCEEDS PCB REMEDIAL CRITERIA
- SAMPLE LOCATION DOES NOT EXCEED PCB REMEDIAL CRITERIA
- PIPELINE
- SEDIMENT REMOVAL AREA
- SOIL REMOVAL AREA

ESTIMATED TARGET REMEDIAL DEPTH

- 0.5 FT
- 1 FT
- 2 FT
- 3 FT
- 4 FT
- 5 FT
- 6 FT
- 7 FT
- 8 FT
- 9 FT
- 10 FT
- 14 FT

- CREEK SHORELINE (APPROXIMATE)
- PARCEL BOUNDARY
- APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL-PARCEL 6 EXCAVATION LIMITS
- APPROXIMATE LOCATION OF FORMER CITY OF SYRACUSE LANDFILL AREA
- APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL
- APPROXIMATE LOCATION OF 30 FT. WASTE PULL-BACK



NOTES AND ABBREVIATIONS:
1. 2020 AERIAL IMAGERY OBTAINED FROM ESRI WORLD IMAGERY BASEMAP.
2. REMOVAL AREAS ARE AS APPROVED IN THE 2020 PRE-DESIGN INVESTIGATION REPORT (REVISED).
3. HISTORIC SAMPLE LOCATIONS ARE BASED ON THE REMEDIAL INVESTIGATION REPORT, DATED JUNE 2013.
4. LANDFILL DATA LAYERS AND CREEK SHORELINE LAYER OBTAINED FROM A GEODATABASE PROVIDED BY GZA/PALMERTON IN JUNE 2015.
5. PARCEL BOUNDARY DATA OBTAINED FROM ONONDAGA COUNTY IN 2015.
6. THE BOUNDARY LINE BETWEEN REMOVALS IS DEFINED BY THE DEEPER OF THE ADJACENT REMOVALS, WHERE APPLICABLE.

FT: FEET
MG/KG: MILLIGRAMS PER KILOGRAM
PCB: POLYCHLORINATED BIPHENYL

0 100 200 Feet
GRAPHIC SCALE

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

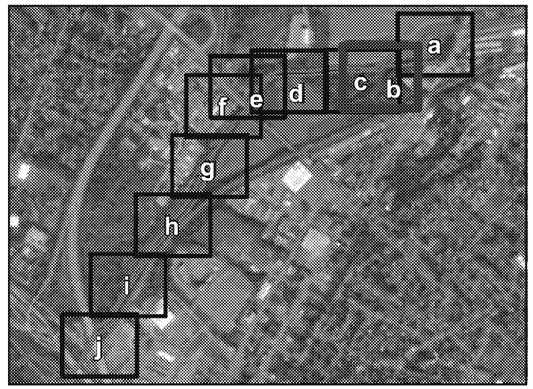
FIGURE
1-3a

City: SYR Div/Group: IM/DV Created By: JRAPP Last Saved By: idrum
LOWER LEY CREEK (B0035101.0001.00001)
T:_ENV\LowerLeyCreekGroup\Syracuse\NY\Remedial_Design_WP\MXD\Prelim_30percent\Fig1-3aet_SoilSample_PCB.mxd 10/21/2021 1:11:16 PM

LEGEND:
- 2019 SOIL SAMPLE LOCATION
- 2017 OR 2018 SOIL SAMPLE LOCATION
- 2017 OR 2018 SEDIMENT SAMPLE LOCATION
- HISTORICAL SOIL SAMPLE LOCATION
- HISTORICAL SEDIMENT SAMPLE LOCATION
- SAMPLE LOCATION EXCEEDS PCB CONCENTRATION OF 50 MG/KG
- SAMPLE LOCATION EXCEEDS PCB REMEDIAL CRITERIA
- SAMPLE LOCATION DOES NOT EXCEED PCB REMEDIAL CRITERIA
- PIPELINE
- SEDIMENT REMOVAL AREA
- SOIL REMOVAL AREA

ESTIMATED TARGET REMEDIAL DEPTH
- 0.5 FT
- 1 FT
- 2 FT
- 3 FT
- 4 FT
- 5 FT
- 6 FT
- 7 FT
- 8 FT
- 9 FT
- 10 FT
- 14 FT

- CREEK SHORELINE (APPROXIMATE)
- PARCEL BOUNDARY
- APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL-PARCEL 6 EXCAVATION LIMITS
- APPROXIMATE LOCATION OF FORMER CITY OF SYRACUSE LANDFILL AREA
- APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL
- APPROXIMATE LOCATION OF 30 FT. WASTE PULL-BACK



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4. LANDFILL DATA LAYERS AND CREEK SHORELINE LAYER OBTAINED FROM A GEODATABASE PROVIDED BY GZA/PALMERTON IN JUNE 2015.
5. PARCEL BOUNDARY DATA OBTAINED FROM ONONDAGA COUNTY IN 2015.
6. THE BOUNDARY LINE BETWEEN REMOVALS IS DEFINED BY THE DEEPER OF THE ADJACENT REMOVALS, WHERE APPLICABLE.

FT: FEET
MG/KG: MILLIGRAMS PER KILOGRAM
PCB: POLYCHLORINATED BIPHENYL

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE **1-3b**

0 100 200 Feet
GRAPHIC SCALE

City: SYR Div/Group: IM/DV Created By: J.RAPP Last Saved By: Idrum
LOWER LEY CREEK (B0035101.0001.00001)
T:_ENV\LowerLeyCreekGroup\SyracuseNY\Remedial_Design_WP\MXD\Prelim_30percent\Fig1-3set_SoilSample_PCB.mxd 10/21/2021 1:11:16 PM

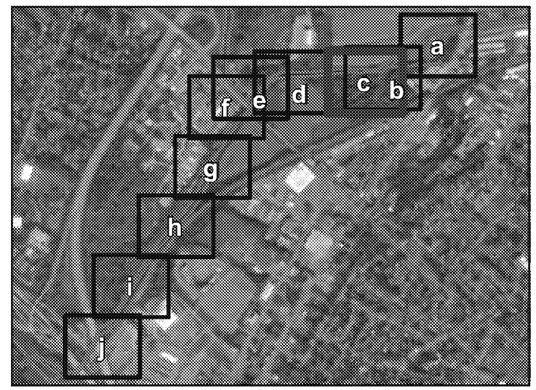
LEGEND:

- 2019 SOIL SAMPLE LOCATION
- 2017 OR 2018 SOIL SAMPLE LOCATION
- 2017 OR 2018 SEDIMENT SAMPLE LOCATION
- HISTORICAL SOIL SAMPLE LOCATION
- HISTORICAL SEDIMENT SAMPLE LOCATION
- SAMPLE LOCATION EXCEEDS PCB CONCENTRATION OF 50 MG/KG
- SAMPLE LOCATION EXCEEDS PCB REMEDIAL CRITERIA
- SAMPLE LOCATION DOES NOT EXCEED PCB REMEDIAL CRITERIA
- PIPELINE
- SEDIMENT REMOVAL AREA
- SOIL REMOVAL AREA

ESTIMATED TARGET REMEDIAL DEPTH

- 0.5 FT
- 1 FT
- 2 FT
- 3 FT
- 4 FT
- 5 FT
- 6 FT
- 7 FT
- 8 FT
- 9 FT
- 10 FT
- 14 FT

- CREEK SHORELINE (APPROXIMATE)
- PARCEL BOUNDARY
- APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL-PARCEL 6 EXCAVATION LIMITS
- APPROXIMATE LOCATION OF FORMER CITY OF SYRACUSE LANDFILL AREA
- APPROXIMATE LOCATION OF CLOSED CROUSE HINDS LANDFILL
- APPROXIMATE LOCATION OF CLOSED TOWN OF SALINA LANDFILL
- APPROXIMATE LOCATION OF 30 FT. WASTE PULL-BACK



NOTES AND ABBREVIATIONS:
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3. HISTORIC SAMPLE LOCATIONS ARE BASED ON THE REMEDIAL INVESTIGATION REPORT, DATED JUNE 2013.
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5. PARCEL BOUNDARY DATA OBTAINED FROM ONONDAGA COUNTY IN 2015.
6. THE BOUNDARY LINE BETWEEN REMOVALS IS DEFINED BY THE DEEPER OF THE ADJACENT REMOVALS, WHERE APPLICABLE.

FT: FEET
MG/KG: MILLIGRAMS PER KILOGRAM
PCB: POLYCHLORINATED BIPHENYL

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE **1-3c**

City: SYR Div/Group: IM/DV Created By: JRAPP Last Saved By: ldrum
LOWER LEY CREEK (B0035101.0001.00001)
T:_ENV\LowerLeyCreek\Group\Syracuse\NY\Remedial_Design_WPMXD\Prelim_30percent\Fig1-3set_SoilSample_PCB.mxd 10/21/2021 1:11:16 PM

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APPROXIMATE AREA OF PREVIOUS WESTERN DRAINAGE SWALE EXCAVATION

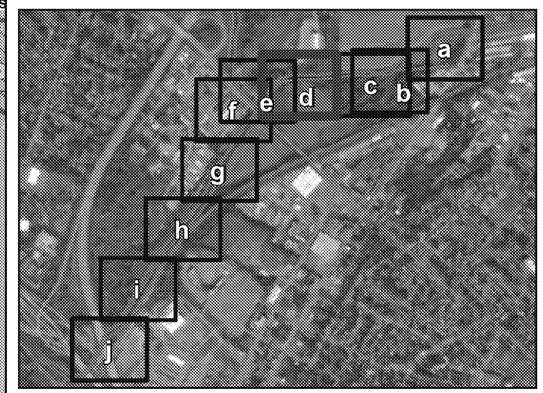
SOIL-D-027-STEP4
SOIL-D-027-STEP2
SOIL-D-027-STEP3
SOIL-D-027-STEP
LLCD32
SOIL-D-T006
SOIL-D-T005
SOIL-D-027
SOIL-D-T004
SOIL-D-026-STEP3
SOIL-D-017-STEP
SOIL-D-T003
SOIL-D1
SOIL-D-019-STEP
SOIL-D-018
SOIL-D-011
SOIL-D-017
SOIL-D-019
SOIL-D-012
SOIL-D-026
SOIL-D-026-STEP2
SOIL-D-010
SOIL-D-020-STEP
SOIL-D-T002
SOIL-D-020
SOIL-D-009
SOIL-D
SED-G5
SED-G3
SOIL-D-026-STEP
SOIL-D-T001
LLCD51
SP-3
SP-5
SOIL-D-013
LLCD28
SED-G2
SED-G1
SP-2
SP-4
SED-G-002R
SED-G-003R
SED-G-004R
SED-G7
SED-G
SOIL-D-021-STEP
LLCD29
R3-2
SED-G-003C
SED-G8
SOIL-D-016
SED-G-001R
SED-G-002C
R3-4
SED-G10
R3-1
SED-G-004C
SED-G-001C
SED-G-002L
SED-G-003L
SED-G-004L
SOIL-D-021
SOIL-D-008
SOIL-H-016
SOIL-H-015
SED-G-001L
SOIL-E-012
SED-G6
SOIL-D-015
SOIL-D-005
SOIL-H-018
SOIL-H-006
SED-F
SOIL-H-014
SOIL-E-006
SOIL-E-008-STEP
SED-G4
SOIL-H-006-STEP
SED-F-005
LLCD30
SOIL-E-008
SOIL-H1
SOIL-H-T002
SOIL-H-017
SOIL-E-013
SOIL-H-T001
SED-G9
SOIL-D-004
SOIL-H-019
LLCD49
LLCD33
SOIL-D-014
SOIL-E-005
SOIL-E-007
SOIL-E-007-STEP
MATCHLINE 3
SED-F-004
SOIL-D-003
SOIL-E-T006
LLCD31
LLCD26
SOIL-F-002
LLCD25
SED-F9
SOIL-E-004
SOIL-E
SOIL-E-009
SOIL-F-001
SOIL-D-002
SOIL-E-T005
SOIL-E-T004
SOIL-F-003
SED-F-003R
SOIL-E-014
SOIL-E-001
LLCD34
SED-F-003C
SOIL-E-003
SED-F-003L
LLCD27
SOIL-E-T002
SOIL-E-T003
R3-12
SOIL-E-011
SOIL-E-002
SED-F-002C
SOIL-E-T001
SOIL-E-010
SED-F-002L
SOIL-E-011-STEP
SOIL-E-015
SOIL-E-015-STEP
SOIL-E-016
SOIL-E-016-STEP
MATCHLINE 2

0 100 200 Feet
GRAPHIC SCALE

LEGEND:
- 2019 SOIL SAMPLE LOCATION
- 2017 OR 2018 SOIL SAMPLE LOCATION
- 2017 OR 2018 SEDIMENT SAMPLE LOCATION
- HISTORICAL SOIL SAMPLE LOCATION
- HISTORICAL SEDIMENT SAMPLE LOCATION
- SAMPLE LOCATION EXCEEDS PCB CONCENTRATION OF 50 MG/KG
- SAMPLE LOCATION EXCEEDS PCB REMEDIAL CRITERIA
- SAMPLE LOCATION DOES NOT EXCEED PCB REMEDIAL CRITERIA
- PIPELINE
- SEDIMENT REMOVAL AREA
- SOIL REMOVAL AREA

ESTIMATED TARGET REMEDIAL DEPTH
- 0.5 FT
- 1 FT
- 2 FT
- 3 FT
- 4 FT
- 5 FT
- 6 FT
- 7 FT
- 8 FT
- 9 FT
- 10 FT
- 14 FT

- CREEK SHORELINE (APPROXIMATE)
- PARCEL BOUNDARY
- APPROXIMATE LOCATION OF FORMER CITY OF SYRACUSE LANDFILL AREA
- APPROXIMATE LOCATION OF CLOSED CROUSE HINDS LANDFILL
- APPROXIMATE LOCATION OF 30 FT. WASTE PULL-BACK



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FT: FEET
MG/KG: MILLIGRAMS PER KILOGRAM
PCB: POLYCHLORINATED BIPHENYL

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE
1-3d

City: SYR Div/Group: IM/DV Created By: JRAPP Last Saved By: idrum
LOWER LEY CREEK (B0035101.0001.00001)
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LEGEND:
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- SOIL REMOVAL AREA

ESTIMATED TARGET REMEDIAL DEPTH
- 0.5 FT
- 1 FT
- 2 FT
- 3 FT
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- APPROXIMATE LOCATION OF FORMER CITY OF SYRACUSE LANDFILL AREA
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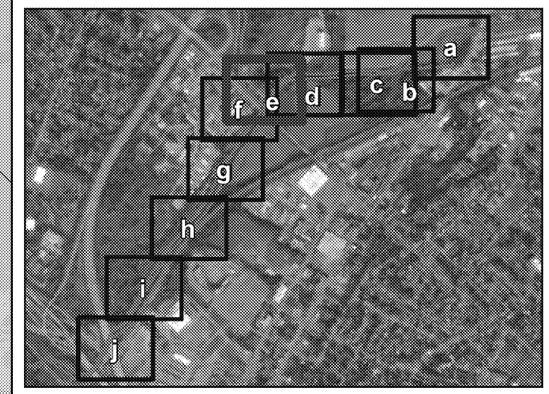

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SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE
1-3e

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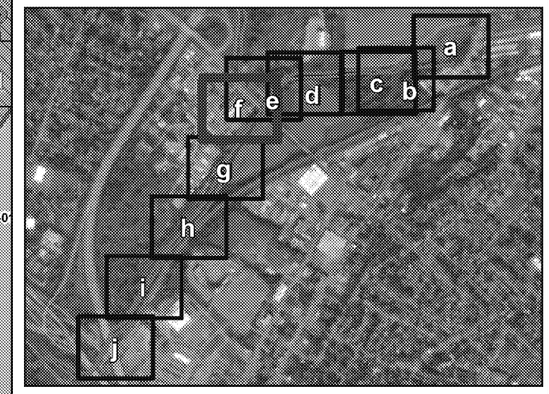

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SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE 1-3f

City: SYR Div/Group: IM/DV Created By: JRAPP Last Saved By: ldrum
LOWER LEY CREEK (B0035101.0001.00001)
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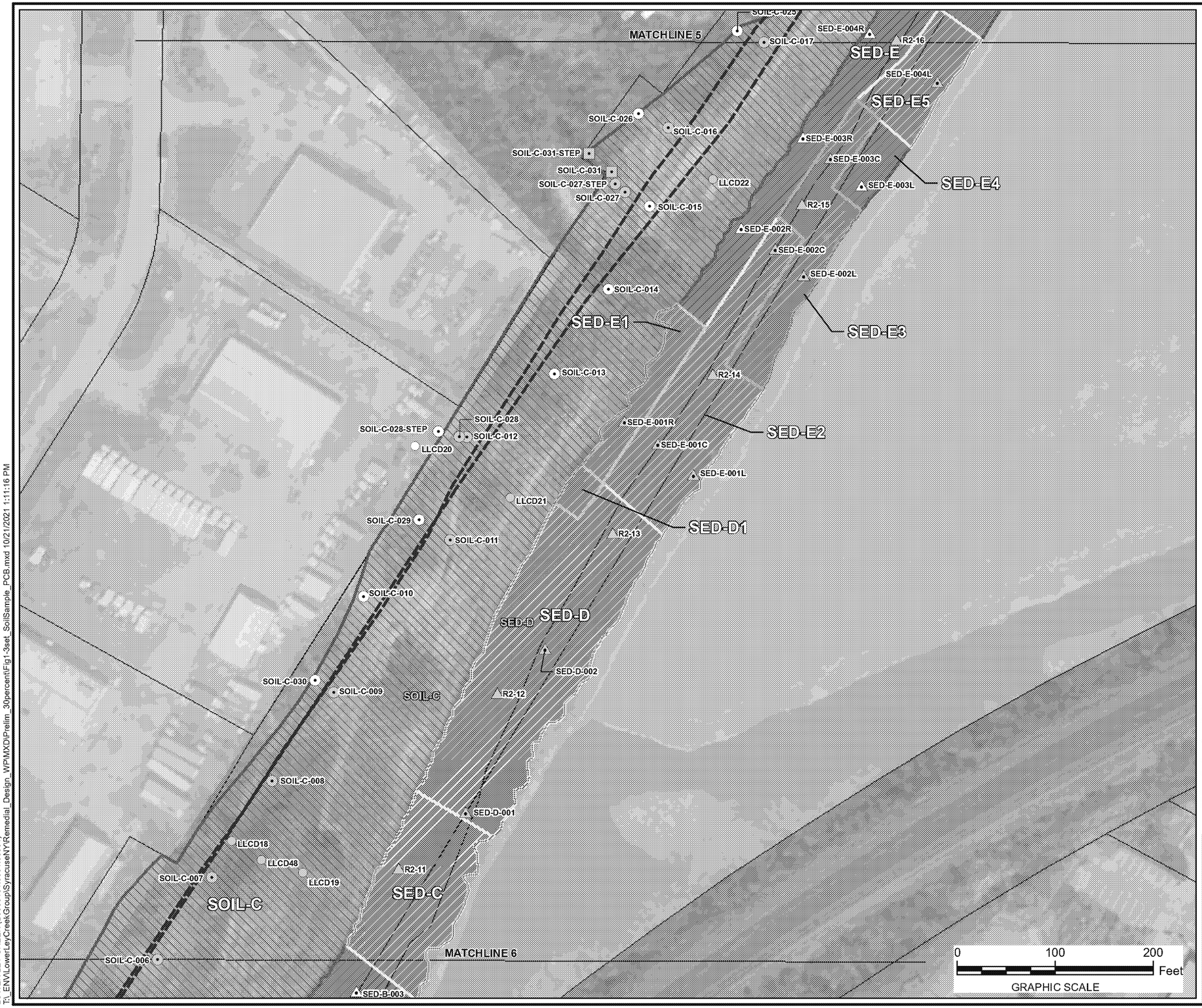

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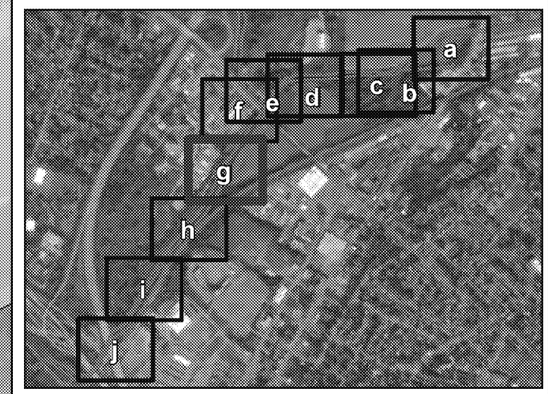

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LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE

PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE 1-3g

City: SYR Div/Group: IM/DV Created By: JRAPP Last Saved By: tdrum
LOWER LEY CREEK (B003510\1.0001.00001)
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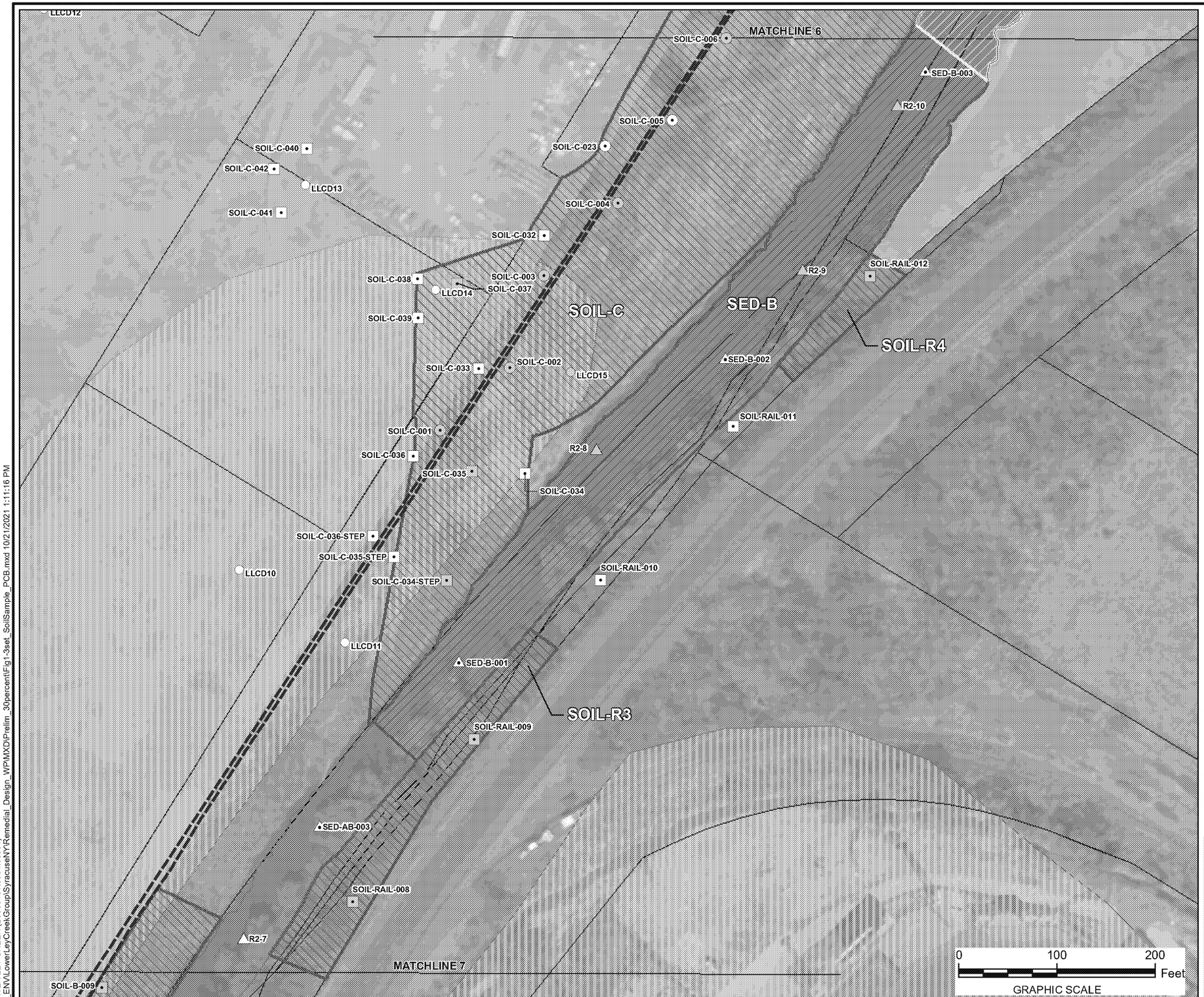

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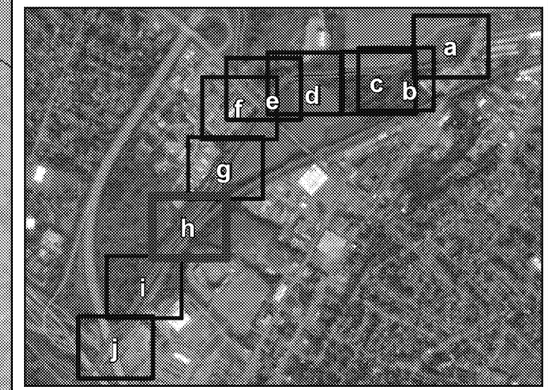
- NYSDEC WETLANDS (SYW-11)



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LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE 1-3h

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LOWER LEY CREEK (B0035101.0001.00001)
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MATCHLINE 7

SOIL-B-009
LLCD07
SED-AB-002
SOIL-B-008
SOIL-B-005
SOIL-RAIL-007
SOIL-B-007D
SOIL-B-007B
R2-6
LLCD08
SOIL-B-007D-STEP2
SOIL-B-007
SOIL-B-004
SOIL-B-007C
SOIL-B-007A
SED-AB-001
SOIL-B
SOIL-B-003
SOIL-B-006
SOIL-RAIL-006
R2-5
SOIL-B-002
LLCD47
SOIL-R2
LLCD03
SOIL-B-001
R2-4
SOIL-RAIL-005
SOIL-B-010
SOIL-B-011
R2-3
SOIL-RAIL-004
LLCD04
SED-A
LLCD05
R2-2
SOIL-RAIL-003
LLCD01
R2-1
MATCHLINE 8
SOIL-RAIL-002

0 100 200 Feet
GRAPHIC SCALE

LEGEND:
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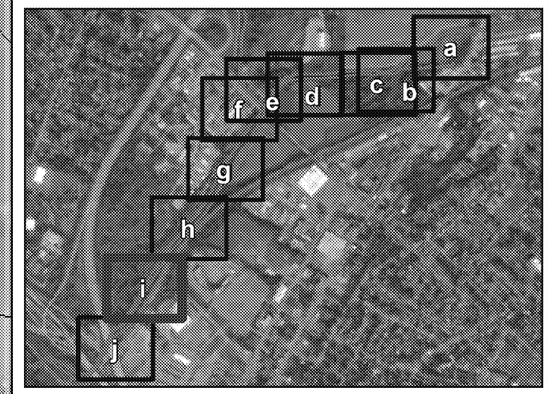

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LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE 1-3i

City: SYR Div/Group: IM/DV Created By: JRAPP Last Saved By: ldrum
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MATCHLINE 8

R2-1

SOIL-RAIL-002

LLCD02

SOIL-R1

SED-A

SOIL-RAIL-001

LEGEND:

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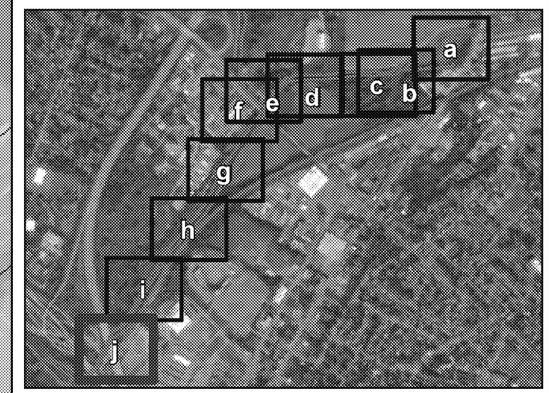

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0 100 200 Feet

GRAPHIC SCALE

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE

PRELIMINARY (30%) REMEDIAL DESIGN

SAMPLE COLLECTION LOCATIONS AND PRE-DESIGN REMOVAL AREAS

ARCADIS

FIGURE
1-3j

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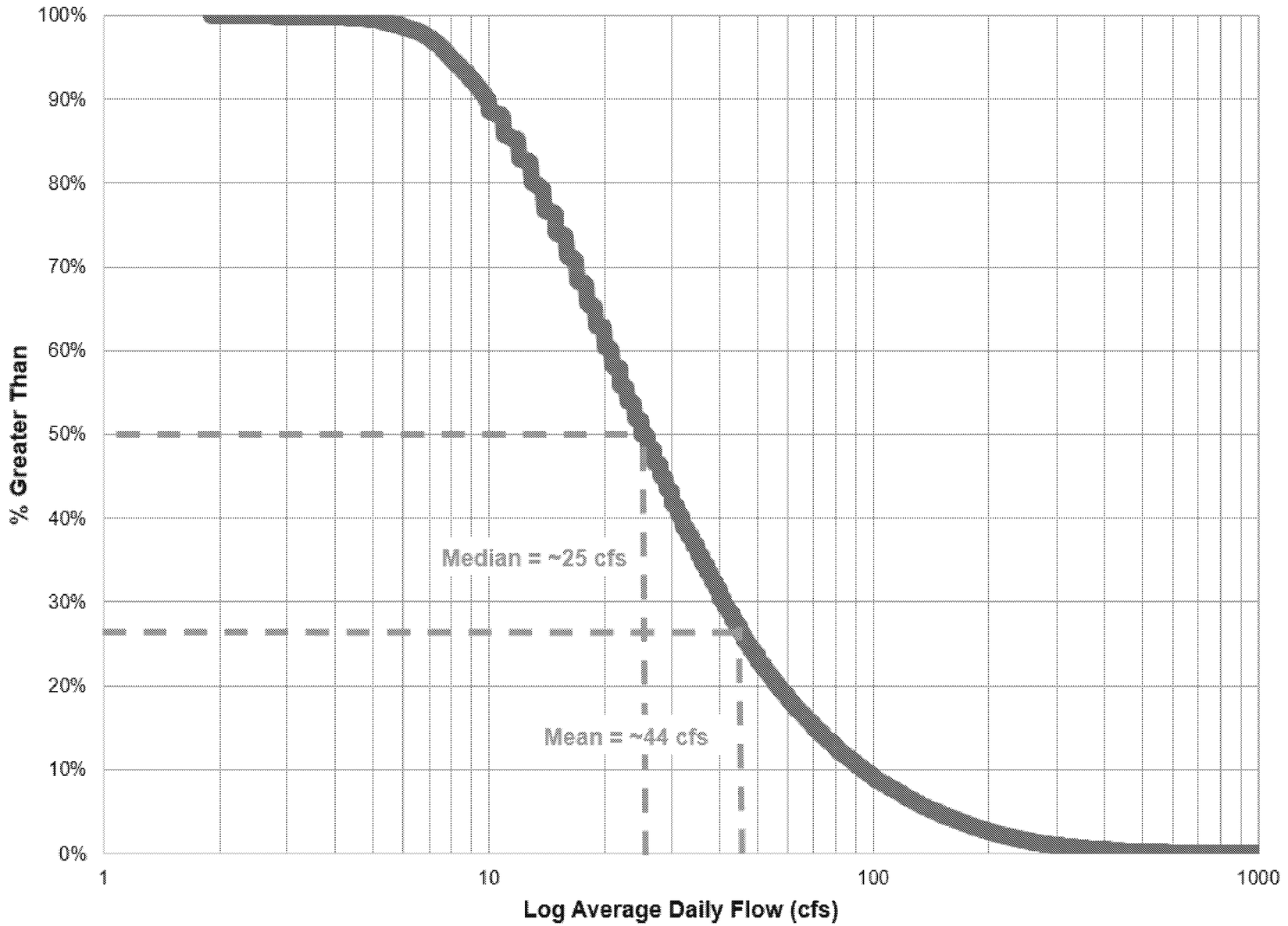

Note:
1. Average Daily Flow in cubic feet per second (cfs) obtained from United States Geological Survey (USGS) stream gauge station, USGS 04240120 Ley Creek. Period of record is 1973 through 2020.

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

CUMULATIVE DISTRIBUTION FREQUENCY OF LEY CREEK AVERAGE DAILY FLOW

ARCADIS | FIGURE 1-4

https://arcadiso365.sharepoint.com/TEAMS/LLCG_US_projects/ARCADIS_Only/11 Draft Reports and Presentations/2021-12 30PD/Figs
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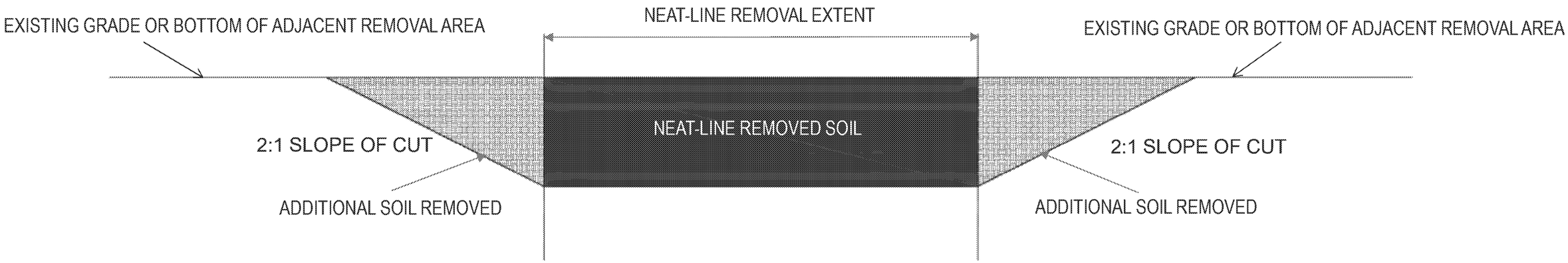
TYPICAL SOIL REMOVAL WITH CUT DEPTH 4 FEET OR LESS

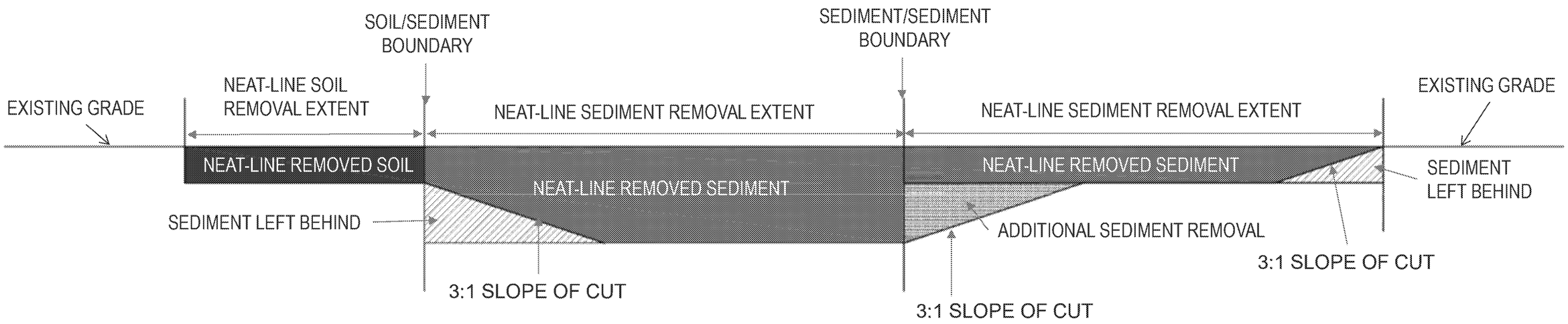


TYPICAL SOIL REMOVAL WITH CUT DEPTH GREATER THAN 4 FEET

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SOIL EXCAVATION STABILITY APPROACH (TYPICAL)

ARCADIS | FIGURE **2-1**



TYPICAL SEDIMENT REMOVAL FOR ANY REMOVAL CUT DEPTH

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

SEDIMENT EXCAVATION STABILITY APPROACH (TYPICAL)

ARCADIS | FIGURE **2-2**

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4. RAILROAD DATA LAYERS WERE OBTAINED FROM ELECTRONIC FILES PROVIDED BY HYDROGEOLOGIC, INC. IN JULY 2015.

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE
PRELIMINARY (30%) REMEDIAL DESIGN

PARCELS LIKELY REQUIRING ACCESS AGREEMENTS FOR REMEDIAL ACTION

ARCADIS

FIGURE 4-1

City: SYR Div/Group: IM/DV Created By: J.RAPP Last Saved By: ldrum
LOWER LEY CREEK (B0035101.0001.00001)
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Appendix A

Preliminary Habitat Restoration Plan

ARCADIS

Respondents to Administrative Order on Consent for Remedial Design

Preliminary Habitat Restoration Plan

Lower Ley Creek Subsite, Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina
Onondaga County, New York

Superfund Site ID: NYD986913580

December 2021

Preliminary Habitat Restoration Plan

Lower Ley Creek Subsite
Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina
Onondaga County, New York

December 2021

Prepared By:
Arcadis of New York, Inc.
110 West Fayette Street, Suite 300
Syracuse
New York 13202
Tel 315 446 9120

Prepared For:
Respondents to Administrative Order on Consent for Remedial Design

Our Ref:
B0035101.0001 / 30059709

Contents

Tables

Figures

Attachments

Acronyms and Abbreviations

BEHI	Bank Erosion Hazard Index
GPS	global positioning system
NA	not applicable
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
PDI	Pre-Design Investigation
Preliminary RD	Preliminary (30%) Remedial Design for Lower Ley Creek
RA	remedial action
RD	remedial design
RD SOW	Remedial Design Statement of Work
RD Respondents	Respondents to the Administrative Order on Consent for Remedial Design
ROD	Record of Decision
SAV	submerged aquatic vegetation
Subsite	Onondaga Lake Superfund Site, Operable Unit 25 - Lower Ley Creek
SVAP	Stream Visual Assessment Protocol
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

1 Introduction

This preliminary Habitat Restoration Plan provides initial conceptual details for the restoration and mitigation of aquatic and floodplain habitats that will be impacted by remedial action (RA) performed pursuant to requirements of the Record of Decision (ROD; United States Environmental Protection Agency [USEPA] 2014) and the Remedial Design Statement of Work (RD SOW; USEPA 2016) for Onondaga Lake Superfund Site, Operable Unit 25 - Lower Ley Creek (the Subsite). The selected RA includes dredging of channel bottom sediments and floodplain soil removal; these actions will impact aquatic resources found within Ley Creek and Old Ley Creek, as well as wetland and floodplain ecological communities. This plan has been prepared as Appendix A to the Preliminary (30%) Remedial Design for the Subsite (the Preliminary RD).

The Habitat Restoration Plan includes descriptions of habitats and the planned restoration design for habitat reconstruction and restoration. It is anticipated restored upland areas will match pre-excavation conditions in most areas.

Preliminary Design Drawings detail example cross-sections of disturbed areas and appropriate restoration details for each (the Design Drawings are presented as Appendix B to the Preliminary RD). Extents of disturbance will be developed during the Remedial Design (RD) process and indicated in forthcoming Design Drawings; however, the extents are anticipated to be based on elevation, as described in Section 4. Design details related to habitat restoration will be developed during the RD process and included in the following related Specification Sections:

- 31 05 16, Aggregate for Earthwork
- 31 23 23, Soil Backfill and Capping
- 32 90 00, Plantings and Restoration
- 35 43 00, Sediment Backfill and Capping.

1.1 Regulatory Guidance

This preliminary Habitat Restoration Plan is prepared in compliance with the United States Army Corps of Engineers (USACE) compensatory mitigation required for unavoidable impacts to waters of the United States under Sections 404 and 401 of the Clean Water Act and state-regulated areas that include state open waters and wetlands to meet the substantive requirements of 6 New York Codes, Rules and Regulations (NYCRR) Part 608 and 663 and in accordance with the RD SOW. This plan meets the requirements of the RD SOW and planning and documentation needs of the mitigation plan (33 Code of Federal Regulations § 332.4c; paragraphs 2c through 14c; 40 CFR § 230.93 - General compensatory mitigation requirements). These specific requirements include elements identified from the RD SOW and USACE mitigation guidance as listed below:

Per RD SOW:

- Description of delineated wetlands and habitats for affected areas of the Subsite.
- Description of habitat restoration activities to be undertaken after the implementation of soil and sediment excavation activities, including:
  - Descriptions and specifications of the types and extents of backfill material to be placed in each delineated area.

  - Descriptions and specifications of the types and locations of any seeding and plantings to be placed in each delineated area.
  - Established design expectations for habitat construction in soil excavation areas and excavated wetland areas: the restoration will meet the substantive requirements of 6 NYCRR Part 608 and 663.
- Description of requirements for monitoring the restored habitats after completion of the RA construction activities to assess restoration success and restoration maintenance.
- Consideration of actions needed, if any, for protection of affected species.

Per USACE mitigation guidance the 12 key concepts include:

- Goals and objective
- Site selection
- Site protection instrument
- Baseline conditions
- Determination of credits
- Mitigation work plan
- Maintenance plan
- Performance standards
- Monitoring requirements
- Long-term management plan
- Adaptive management plan
- Financial assurances.

1.2 Restoration and Mitigation Objectives

The overall goal of the habitat restoration program is to reestablish the structure and function of habitats impacted by the remedy and, where determined to be appropriate and feasible, identify opportunities for improvement such as increasing instream cover and increasing plant species diversity and composition. Opportunities to increase functional wetland habitat acreage may be utilized, pending further discussions with USEPA, USACE, and property owners. Specifically, there may be areas of excavation for southern bank soils north of 7th North Street (i.e., SOIL-E, -H, -I, -I1, -I2, and -I3) which may not be backfilled to pre-construction grade to allow for increase flood storage capacity in the floodplain.

During the Pre-Design Investigation (PDI) (Arcadis 2020), the existing aquatic and floodplain resources were characterized and defined for those areas impacted by the RA and are used for the basis of the habitat restoration design. These regulated habitats include the channel bottom of Ley Creek, Old Ley Creek, and surrounding wetlands within the floodplain. Remaining habitat areas disturbed through the RA include upland habitat and other areas influenced by human activity. Details related to the PDI results are provided in the PDI Report (Arcadis 2020).

Specifically, these habitats include restoration of shallow to deep run aquatic habitat that contains floating and submerged aquatic vegetation (SAV), Shallow Emergent Marsh wetlands that extend from the main channel of Ley Creek into the floodplain, forested/scrub-shrub wetlands perched in the floodplain, and uplands that are

primarily characterized as Southern Successional Hardwood Forest. The mitigation of these resources will generally be performed as "in-kind" and will occur onsite for compensatory compensation. The planned restoration will look to provide enhancements to aquatic habitats and the floodplain to meet anticipated mitigation credits.

Habitat restoration will include structural and biological elements that can be designed, constructed, monitored, and managed for onsite areas impacted by the remedy. The fundamental component is the placement of substrate, augmented with vegetation and/or instream habitat features such as boulders and woody debris. Habitat development will be influenced by ongoing natural processes. Principal among these is the evolution of sediment that results from ongoing sedimentation of detrital organic matter, mineral solids, and woody debris that enter from upstream and along the shoreline. Based on the dynamic nature of these processes, extensive aquatic vegetation restoration within the primary flowing channel will not be implemented through direct plantings, but rather rely on natural recolonization to establish these areas over time.

2 Site Characterization

The Subsite is located within an urbanized and industrial section northwest of the city of Syracuse in the Town of Salina. The Subsite consists of the lower 2 miles of Lower Ley Creek, beginning at and including the U.S. Route 11 Bridge (i.e., Brewerton Road) and ending downstream at Onondaga Lake. The creek flows through a landfill, under several bridges, along a railroad track, adjacent to several businesses, and near a major shopping mall. The land surrounding Lower Ley Creek is mostly industrial. The surrounding area has been urbanized for many decades and contains numerous industries, a landfill, roads, businesses, and other infrastructure.

The creek itself is not used commercially, although from boat it is accessible for fishing and other recreation up to the United States Geological Survey gage weir above the Park Street Bridge. Upstream of this weir, accessibility is more limited and channel water depths are shallower and less desirable for fishing opportunities to the U.S. Route 11 Bridge. Access to the Subsite is unrestricted, and the property is next to a public thoroughfare; however, access is difficult due to thick vegetation.

2.1 Soils

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Web Soil Survey (USDA 2019) data were reviewed along with existing site-specific soil boring information to characterize soils. Within the Subsite, USDA NRCS identified two natural, mineral soils as Collamer Silt Loam (ChB) and Carlisle Muck. Collamer Silt Loam consists of silty and clayey glaciolacustrine deposits, is moderately well drained, with the potential for surface runoff ranging from low to very high. Carlisle Muck consists of highly organic material that is very poorly drained with a depth to the top of a seasonal high-water table ranging between 1 and 2 feet. The remainder of the surrounding area is mapped as cut and fill land or created soils. Cut and fill land consists primarily of gravelly sandy loam and is highly drained. Made or created land consists primarily of channery to very channery loam that is highly drained. A USDA NRCS Web Soil Survey Map of the areas surrounding the Subsite is provided in Figure A1.

This general information was reviewed for applicability to the Subsite, and the basis for the design for the backfill material will be based on use of native topsoil and sands to provide suitable planting media for restored vegetative communities.

2.2 Wetland Delineation and Habitat Characterization

This section provides a description of the delineated wetlands and habitats for affected areas of the Subsite. The predominant habitats observed within the Subsite include:

- Shallow to deep active channel with runs with floating vegetation and SAV
- Shallow Emergent Marsh wetlands that extend from the main channel of Ley Creek into the floodplain (including the subclass of human influenced and disturbed wetlands identified as Common Reed Marsh)
- Forested/scrub-shrub wetlands perched in the floodplain of Ley Creek and Old Ley Creek
- Uplands that are primarily characterized as Southern Successional Hardwood Forest.

2.2.1 Topography and Geomorphic Position

The Subsite lies within the Ontario Lowlands physiographic province and is characterized by low relief within the lake plains typical of glacial moraine topography. Disturbance of the Subsite topography is evident from urbanization and industrialization of the surrounding area that has built up land features over the historical wetland complex that existed. The range of elevation of the floodplain ground surface (as surveyed during the PDI) from the edge of the Ley Creek channel to the extent of RA boundaries indicates a total relief of approximately 13 feet.

The Shallow Emergent Marsh wetlands (including the disturbed Common Reed Marsh) identified during the PDI are found primarily adjacent to the active wetted channel of Ley Creek. The hydrology ranges from full inundation to seasonal inundation depending upon the localized topography and interaction with active channel and surrounding floodplain drainage. The seasonally inundated portions of this habitat occur above the typical bankfull elevation. These wetlands extend into the low gradient floodplain up to and below the modeled 2-year recurrence elevations developed from the hydraulic model, which correlates with the assessment of aerial imagery and field observations to identify changes in vegetation and depressions in floodplain often used to define the ordinary high-water mark. Emergent wetlands also exist higher in the floodplain (i.e., above the 2-year recurrence elevation) and have drainage patterns that utilize localized surface runoff for inundation, rather than direct influence from Ley Creek.

Forested Floodplain wetland identified during the PDI are found outside of the active wetted channels of Ley Creek and Old Ley Creek at elevations above 2-year recurrence flow contours and are influenced by localized topography and surface water runoff in the disturbed floodplain.

2.2.2 Waters and Wetlands

Ley Creek and its surrounding floodplain within the Subsite have been altered throughout time by human disturbance and urbanization, as described in Section 1.1 of the Preliminary RD. This portion of Ley Creek is defined primarily as an unconfined riverine habitat (Edinger et al. 2014); however, this section of aquatic channel has been altered through re-routing and disposal activities associated with landfill development within the floodplain. The Cowardin classification (Cowardin et al. 1979) is listed as R2UBHx; defined as riverine in lower perennial setting with low gradient, unconsolidated bottom (defined by all wetlands and deepwater habitats with at least 25 percent cover of particles smaller than stones [less than 6-7 cm] and a vegetative cover less than 30 percent), permanently flooded (defined as water covering the substrate throughout the year in all years), and excavated (modifier used to identify wetland basins or channels that were excavated). Due to the excavation activities, portions of the former floodplain are now confined, with higher entrenchment of the channel starting just upstream of the Park Street Bridge and influenced by the existing CSX railway corridor and built-up bank along the southeastern shoreline and extending downstream to the Onondaga Lake Parkway Bridge.

Existing Ley Creek channel substrate conditions were assessed during the PDI and through both geotechnical borings and qualitative evaluation of stream substrates performed using the Stream Visual Assessment Protocol (SVAP; USDA 1998). The primary substrates were observed to be fines with sands and gravel, with aggradation of fine materials (silts, clay, and fine particulate organic matter) present throughout much of the channel.

Creek bank stability was evaluated during PDI activities using Rosgen Bank Erosion Hazard Index (BEHI) characterization methods (Rosgen 2001) and identified several types of ecological communities, including forested, successional, scrub-shrub, wetland, and man-made (bermed) banks. In general, most banks were

relatively stable, although pockets of erosion and sloughing were found in non-armored areas where the floodplain banks were impacted by high flow events. Bank heights ranged from 2.0 to 5.8 feet, with bankfull heights of 0.9 to 2.1 feet. Bank slopes ranged from 5 to 70 degrees. Vegetative protection ranged from 10 to 90 percent, with some material adjustments for cobbles observed to lower BEHI estimates. Both forested and successional bank habitats indicated higher potential for erosion, based on poor vegetative cover and rooted densities. Overall, the BEHI estimates ranged from "low" to "high" depending upon the ecological community present, with an average condition of "moderate" for Ley Creek, indicating that current banks have varying degrees of bank instability.

The Old Ley Creek channel drains a small 0.11 square mile basin that consists of only 7 percent forested canopy and receives groundwater and surface drainages primarily to the southeast across U.S. Route 11. This creek is not characterized using a Cowardin classification by the United States Fish and Wildlife Service (USFWS) within their online wetlands mapper (USFWS 2021), but PDI characterization of this aquatic resource would detail this as R3RBHx; defined as riverine in upper perennial setting with moderate gradient (as observed with riffle-run morphology), rock bottom (defined by substrates having an areal cover of stones, boulders, or bedrock 75 percent or greater and vegetative cover of less than 30 percent), permanently flooded (defined as water covering the substrate throughout the year in all years), and excavated (modifier used to identify wetland basins or channels that were excavated). The dominant substrates found within these habitats were primarily gravels and sands with shallow water depths: 1 to 3 inches in riffles and up to 6 inches in runs. Riffles were slightly embedded with estimates ranging from 10 to 25 percent, while run habitats indicate moderate embeddedness ranging from 60 to 70 percent. Trace amounts of large woody debris were found in riffles, with a higher amount of large woody debris found in the run habitats. SAV was not present in the riffle and run habitats, but some trace amounts of duckweed (*Lemonidae spp.*) were observed along the margins of the downstream riffle.

Existing Old Ley Creek channel substrate conditions were assessed during the PDI and through both geotechnical borings and qualitative evaluation of stream substrates performed using the SVAP methods. The primary substrates were primarily gravels and sands, with some aggradation of fine materials (silts, clay, and fine particulate organic matter) present within some of the run habitat.

Creek bank stability for Old Ley Creek was evaluated during PDI activities using BEHI characterization methods and identified bank conditions indicated areas of disturbance and active erosion from high flow events. The banks are primarily associated with riparian forested and successional habitats. In general, most banks were relatively stable, although pockets of erosion and sloughing were found in non-armored areas where the floodplain banks were impacted by high flow events. Bank heights ranged from 2.0 to 5.8 feet, with bankfull heights of 1.0 to 1.3 feet. Bank slopes ranged from 10 to 70 degrees. Vegetative protection ranged from 10 to 70 percent, with some stratification of bank materials observed. Both forested and successional bank habitats exhibited BEHI ratings of "high", indicating the potential for poor bank stability.

The boundaries of identified wetlands along the stream corridor and within the remediation area were delineated during the PDI (see Section 2.8, and Appendix F to the PDI Report [Arcadis 2020]), and the vegetation of each wetland was characterized to assist with the resource impact quantification, permit equivalency package, and restoration design. Common Reed Marsh wetlands dominated by common reed were located along much of the length of the Subsite stream corridor. Terrestrial habitat in the soil remediation areas consisted of a mix of actively used land and degraded Southern Successional Forest and Shrubland, dominated by invasive species.

Wetlands defined in the project area include those identified previously by National Wetlands Inventory (NWI) and New York State Wetlands mapping. The New York State Department of Environmental Conservation (NYSDEC)

wetland and NWI wetlands were mapped from aerial imagery in 1986 and 1978, respectively, and may not reflect the current land use and existing conditions. A scrub-shrub wetland (PSS1E) of approximately 1.8 acres is mapped by NWI in the vicinity of Old Ley Creek, and a forested/scrub-shrub wetland (PFO1/SS1E) of approximately 3.23 acres is mapped by NWI along the east bank of Lower Ley Creek, just north of 7th North Street. A New York State Freshwater Wetland (SYW-11) encompassing 80.6 acres (including check zone buffer) is mapped in areas on both sides of Lower Ley Creek, but not directly adjacent to the Lower Ley Creek. The mapped state wetland covers areas developed since map preparation including NBT Bank baseball stadium and the Syracuse Regional Transportation Center. The NYSDEC and NWI wetlands were mapped from aerial imagery in 1986 and 1978, respectively, and do not reflect current land use and existing conditions in most cases. The NYSDEC and NWI wetlands, along with the PDI delineated wetlands, are shown on attached Figures A2 to A9. For the basis of the RD, only PDI-delineated wetlands are utilized and shown on Design Drawings (Appendix B of the Preliminary RD). Based on the existing land use and development changes, the delineation of current wetland boundaries for the RD was performed as part of the PDI characterization activities. The PDI wetland delineation was based on observed characteristics of subsite vegetation, hydrology, and soils consistent with the requirements of the Routine Method presented in the 1987 USACE Wetlands Delineation Manual (Environmental Laboratory 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (USACE 2012), and the New York State Freshwater Wetlands Delineation Manual (NYSDEC 1995). PDI activities delineated wetland areas impacted by planned remedial activities and include both Palustrine Emergent and Palustrine Forested classified wetlands. The ecological community types of these wetlands are primarily Shallow Emergent Marsh (with Common Reed Marsh) and Floodplain Forest.

The ecological community within the upland is defined primarily as Southern Successional Hardwood Forest, with portions of existing land cover as Mowed Roadside/Pathway, Landfill/Dump, and Unpaved Road/Path.

2.3 Vegetation

Vegetation characterization was performed during the PDI for wetlands and upland habitats found within the Subsite for those areas impacted by the RA. The dominant species identified from vegetation plots and meander survey during the PDI included:

- Existing tree species – Black willow (*Salix nigra*), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), hackberry (*Celtis occidentalis*), box elder (Acer negundo), green ash (*Fraxinus pennsylvanica*), black walnut (*Juglans nigra*), and black locust (*Robinia pseudoacacia*) were observed on the banks and within the floodplain.
- Invasive and nuisance species – Common buckthorn (*Rhamnus cathartica*) and tree of heaven (*Ailanthus altissima*) were observed within the canopy and understory, and emergent wetlands were dominated primarily by common reed (*Phragmites australis*).
- Herbaceous understory – The understory is dominated by green ash saplings, moneywort (*Lysimachia nummularia*), common reed, and jewelweed (*Impatiens capensis*) within the forested wetland habitat. The upland herbaceous species found were limited based on sunlight penetration and disturbance, but included dame's rocket (*Hesperis matronalis*), creeping Charlie (*Glechoma hederacea*), garlic mustard (*Alliaria petiolate*), and Japanese knotweed (*Fallopia japonica*). All of these are non-native species, common in urbanized and previously disturbed environments.

Aquatic habitat characterization was performed during the PDI (see Section 2.7 of Appendix E to the PDI Data Summary Report [Arcadis 2020]). Determination of the presence and speciation of aquatic vegetation was made

during characterization activities. SAV species observed within the run habitats during the PDI activities included pondweed (*Potamogeton spp.*), waterweed (Elodea spp.), water milfoil (*Myriophyllum spp.*), water stargrass (*Heteranthera dubia*), and coontail (*Ceratophyllum demersum*). Along the margins of the run habitats emergent vegetation species included common reed (Phragmites spp.), arrow arum (*Peltandra virginica*), and soft-stem bulrush (*Schoenoplectus tabernaemontani*).

2.4 Threatened and Endangered Species

The wildlife observations and aquatic habitat characterization activities performed during the PDI identified several species of fish, herptiles, mollusks, mammals, and birds within the Subsite. In addition, the aquatic habitat characterization qualitatively assessed the presence and absence of Stream Visual Assessment Protocol Variables (USDA 1998) for fish habitat and general habitat type characteristics (e.g., water depth, inorganic substrate composition, SAV, large woody debris, embeddedness). During these activities, no sensitive species or known critical habitats were observed; however, consultation with both NYSDEC and USFWS is required to formally assess potential occurrence within or surrounding the Subsite.

Desktop review of potential state- or federally listed threatened or endangered species utilized the NYSDEC Environmental Resource Mapper and the USFWS IPaC online resource. These informal consultations detailed the potential for occurrence of one state rare plant or animal species near Onondaga Lake and within the lower portion of Ley Creek and one federally listed endangered species, the Indiana bat (*Myotis sodalis*), along with potentially 14 species of migratory birds that are protected under the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act. The USFWS IPaC initial consultation did not identify known critical habitats for these species; however, further consultation has been initiated to formalize species listings through both the New York State Natural Heritage Program and USFWS IPaC online submittals. Consultation results will be reviewed and incorporated into subsequent RD deliverables Any required best management practices will be implemented to avoid the potential for incidental take of threatened and endangered species during the RA or within the restoration process and to support a no effect determination.

3 Remedial Action Impact Analysis and Mitigation Requirements

Direct impacts to the aquatic habitat and surrounding floodplain of Ley Creek and Old Ley Creek will be made through implementation of the RA, both within the remediation area and due to construction of support areas. The RD includes 2 miles of disturbance within Ley Creek and Old Ley Creek through sediment removal and restoration, encompassing an estimated area of 13 acres. Soil removal will result in disturbance of an estimated area of 28 acres outside the Ley Creek channel. An additional approximately 10 acres outside the sediment and soil remediation areas are available to the Contractor for use as support areas (as indicated on the Design Drawings, Appendix B to the Preliminary RD), and may be disturbed by construction.

The construction activities are planned to occur as two phases to span across two years. Sediment removal activities within the channel of Ley Creek will generally be completed adjacent to the fringe portions of the Shallow Emergent Marsh and Common Reed Marsh wetlands. During the RD process, additional analysis of the restoration of southern shoreline banks of Ley Creek will be defined to assess increased flood storage capacity and potential net gains of created Shallow Emergent Marsh habitat from changes to floodplain hydrology.

Estimates of impacts to these regulated areas are summarized below in Table A1.

Table A1. Summary of Impacts to Regulated Areas

Regulated Area	Temporary Disturbance to Regulated Areas	Permanent Disturbance to Regulated Areas[1]	Area to be Restored In-kind
Waters	13 acres	NA	NA
Wetlands	19 acres	NA	19 acres
Adjacent Areas (Floodplain and Uplands)	20 acres	NA	20 acres

Note:
1. The potential for permanent disturbance to regulated areas will be evaluated during the RD process with regard to areas where capping is proposed instead of removal.

Acronym:
NA = not applicable

Specific impacts to wetlands delineated during the PDI are described below. The RA will impact the majority of the wetlands identified during the PDI, including the following:

- Palustrine Emergent (Shallow Emergent Marsh, Common Reed Marsh) – Approximately 18.4 acres are anticipated to be impacted. The dominant vegetation found within these wetlands is common reed.
- Palustrine Forested (Floodplain Forest) – Approximately 0.6 acres are anticipated to be impacted. The dominant canopy (tree) species found within the Floodplain Forest wetlands are black willow, green ash, and cottonwood. The dominant understory (shrub) species found within the Floodplain Forest wetlands are green ash (saplings), grey alder, and common buckthorn (invasive). The dominant herbaceous vegetation found within the Floodplain Forest wetlands are common reed and jewelweed.

As mentioned above, the selected RA includes the dredging of the channel bottom sediments and excavation of floodplain soil that will impact both the aquatic resources found within Ley Creek, Old Ley Creek, and wetland and floodplain ecological communities. The RD SOW calls for restoration of these regulated onsite resources to meet substantive requirements for Sections 404 and 401 of the Clean Water Act and state requirements under 6 NYCRR Part 608 and 663. Based on the overall low habitat quality of both the existing Ley Creek and Old Ley Creek channels and the surrounding wetlands, the mitigation ratio for the permanent and temporary impacts to the aquatic resources found within Ley Creek, Old Ley Creek, and wetland and floodplain ecological communities is proposed to be at 1:1 for in-kind and onsite restoration.

The proposed mitigation approach to offset these losses will use "in-kind-in-place" restoration methods, meaning the same type of habitat will be reconstructed to provide the same functions as the impacted habitat; however, it does not mean that all components of that habitat will be replicated. The primary habitat type to be reconstructed for the project using the in-kind in-place approach is wetlands. Wetland areas will be restored to establish hydrologic function and planted with native wetland species suitable for both Shallow Emergent Marsh and Floodplain Forest vegetative communities. In channel habitats will be reconstructed to provide enhanced fish habitat through varying flow geometries, placement of in-stream cover (e.g., boulders, large woody debris), and aquatic vegetation will be established either through planting or natural recolonization. Additionally, as described in Section 1.2, backfill may not be restored to pre-construction grade to increase flood storage capacity in select areas of the floodplain, which in turn may be used for creation of additional wetlands to offset losses elsewhere.

4 Proposed Restoration Approach

This section details the basis of design used to restore the regulated areas of wetlands and open water habitats impacted by the RA. Sequencing for the installation of planting materials and seed mixes will follow backfill, grading, and preparation of remediated areas and be installed in appropriate seasonal time windows. Based on when regrading of the banks and floodplain work is completed, riparian areas may be seeded and planted in the same year as the work occurs, or the following year at the latest. Areas that cannot be seeded and planted in the same year as the regrading will be stabilized with a temporary seed mix, covered with erosion control fabric, and further stabilized with coir logs or hay bales to prevent potential erosion from surface runoff or significant flow events.

The design approach used to restore these impacted habitat areas are based on field surveyed estimates of bankfull conditions, floodplain vegetation zones (i.e., wetlands and upland boundaries), and the use of 2- and 5-year recurrence elevation contours (see Section 1.2.3 of the Preliminary RD) to determine the type of restoration suitable for the expected hydrology found within the floodplain of Lower Ley Creek. Hydraulic modeling was developed to support the RD process, including to predict typical flood water elevations for specific storm recurrence intervals to aid in restoration design of channel and floodplain habitats (see Section 1.2.3 of the Preliminary RD). Note that within the ROD, there is mention of adding more flow capacity and conveyance through lowering bank topography within portions of the southern bank floodplain upstream of 7th North Street. If backfill does not return topography to pre-construction grade, near-shore and floodplain habitat boundaries illustrated on the Design Drawings included in Appendix B may change (including inundated shoreline and fringe emergent wetlands within the Shallow Emergent Marsh, Riparian Banks, and Uplands). The general extent of restoration for each habitat type is as follows:

- Active Channel: The wetted area at or below the typical water line, as defined by the PDI topographic survey (see Section 2.4 of the Preliminary RD).
- Shallow Emergent Marsh (including existing Common Reed Marsh): Wetted near-bank area at or below the typical water line and at or below the 2-year recurrence elevations defined by the hydraulic model (see Section 2.1).
- Riparian Banks: In between the 2- and 5-year recurrence elevation contours, plantings and seed mix will be adapted to those species that can tolerate varying degrees of seasonal inundation.
- Upland (i.e., Southern Successional Hardwood Forest): Above the 5-year recurrence elevation.

For the purposes of the restoration design, Common Reed Marsh will be restored as Shallow Emergent Marsh using native plantings. Additionally, disturbed forested wetlands will be restored based on the extent of such habitat observed during the PDI and review of Subsite topography and hydrology.

Further hydraulic modeling will be performed during the RD process to refine the predicted hydrology for topography of the restored floodplain. These design refinements will be used to develop the planned restored extents of the regulated wetland habitats (i.e., Shallow Emergent Marsh and Forested Floodplain) that will be illustrated in plan view on the Design Drawings.

This restoration approach is illustrated below as Figure A10 to show the planned planting zones in relation to the proposed elevation contours found within a typical floodplain cross-section.

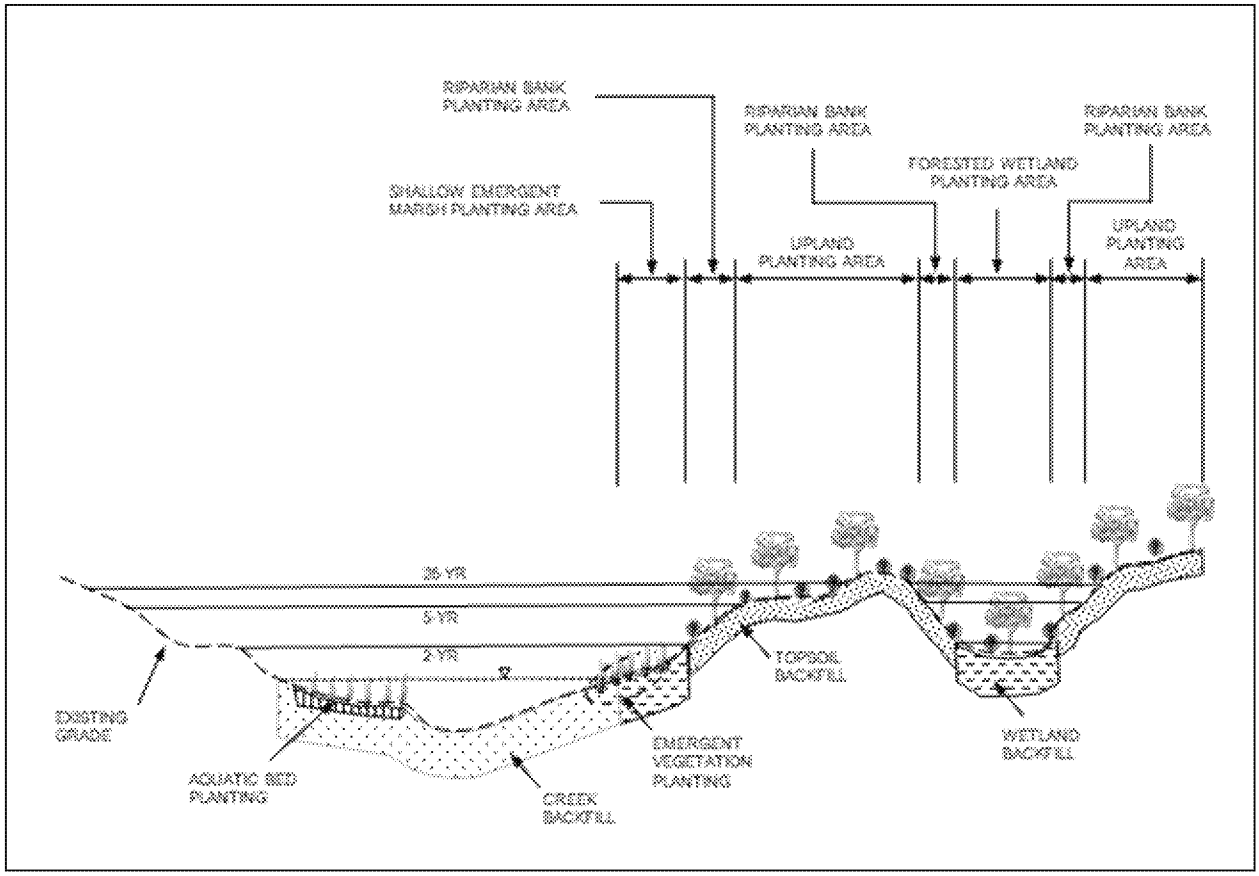

Figure A10. Typical Cross-Section of Restored Habitats

Restoration for areas within the active channel and near-shore bank (i.e., below the 2-year recurrence interval) will include the channel bottom, SAV, and Shallow Emergent Marsh habitats is described in Section 4.1. Restoration for areas typically outside the active channel will include the Riparian Banks, Upland habitat (i.e., Southern Successional Hardwood Forest), and non-wetland floodplain habitats (e.g., maintained lawn) is described in Section 4.2. Forested Floodplain wetlands will be restored using wetland-specific soil and a combination of habitat-specific seed mixes and plantings, as specified in Section 4.3.

As noted in Section 2.7.1 of the Preliminary RD, backfill will be at least 2 feet, except for removal areas SOIL-G (for which the proposed removal depth is less than 2 feet). In addition, there may be areas of excavation for southern bank soils (i.e., SOIL-E, -H, -I, -I1, -I2, and -I3 as defined in the ROD); which may not be backfilled to grade to allow increased flood storage capacity of this floodplain. Final backfill elevations in this portion of the Subsite and other areas will be determined during the design based on flooding potential and desired habitat conditions and in consultation with the property owner.

As specified in Section 2.7.1 of the Preliminary RD, soil removal areas will be backfilled with fill material meeting the criteria set forth in the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 5 (NYSDEC 2010) and the NYSDEC guidelines for Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (NYSDEC 2021). Ecologically sensitive wetland areas identified during the PDI will be backfilled with soil that meets unrestricted SCOs presented in Appendix 5 (NYSDEC 2010). Subsurface soil

backfill material will be selected based on typical general fill materials provided in the New York State Department of Transportation Standard Specifications (2008). In addition, material selection, particularly for the surface soils, will be based on the habitat types identified during PDI wetland and habitat characterization activities. Finally, in accordance with the ROD, sediment removal areas will also be backfilled with fill meeting the criteria of NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 5 (NYSDEC 2010). Gradation and other requirements for channel backfill, wetland soil, and topsoil to be used for backfilling and restoration will be detailed in the Specifications (Appendix C of the Preliminary RD).

Representative cross-sections to detail each planned habitat restoration type and typical construction details for installation of vegetation materials used in the habitat restoration are provided in Drawings C-301 to C-303 and C-501 to C-504 (Appendix B of the Preliminary RD), respectively. Access roads, maintained lawn, and staging areas used during the remediation activities will generally be restored to match pre-disturbance habitat conditions, and based on the details for restoration of removal areas at similar elevations, as presented in the Design Drawings (Appendix B of the Preliminary RD).

A summary of preliminary target species of plantings and seed mixes proposed for restoration of the habitats are included in Tables A1-1 and A1-2 (Attachment A). These tables will be added to the Design Drawings in forthcoming RD submittals to indicate a refined listing of target native trees, shrubs, and herbaceous seed mix species. Design Drawings showing planting details and typical restoration cross sections are included in Appendix B of the Preliminary RD. Additional planting requirements will be included in the Specifications (Appendix C of the Preliminary RD).

4.1 Disturbed Active Channel and Near-Shore Bank Restoration

PDI activities performed within Lower Ley Creek to characterize existing aquatic habitats indicated the presence of predominately low gradient run habitat throughout the Subsite, with one small riffle just downstream of the U.S. Route 11 Bridge, one gravel bar at confluence with Old Ley Creek, and one small backwater just north of the bridge. Run habitat is comprised of gravel, sand, and fines with moderate to high substrate embeddedness. Presence of SAV and limited boulders and large woody debris were observed. Old Ley Creek was comprised of riffle-run sequences comprised of primarily gravel and sand substrates. Riffles indicated low to moderate substrate embeddedness, while the run habitat indicated moderate to high embeddedness. No SAV was observed in Old Ley Creek, but some limited large woody debris and large cobbles were present.

During the RD, the existing conditions hydraulic model (see Section 1.2.3 of the Preliminary RD) will be used to evaluate the materials proposed for restoration (based on the habitat assessment) and bathymetry for restoration and long-term sustainability of Ley Creek.

4.1.1 Channel Backfill

RD activities for channel areas include excavation of sediments from depths of 1 to 10 feet below existing channel bed surface. Subgrade channel backfill materials will be specified from PDI geotechnical borings, sediment characterization, habitat characterization, and hydrodynamic modeling. The backfill will conform with the criteria of NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 5 (NYSDEC 2010).

Based on the PDI findings, subgrade materials sieve analysis indicated D10 (Silt-Clay), D50 (Fine Sand), and D90 (Fine Gravel). Creek backfill will comply with NYSDEC Screening and Assessment of Contaminated Sediment or 6 NYCRR Part 375 Unrestricted Use soil cleanup objectives (other fill and stone) and will come from an approved borrow source with compliant test results. Material will be free of rock and gravel larger than 1.5 inches in any dimension, debris, waste, frozen material, organic material, and other deleterious matter (e.g., inorganic debris). Material will be rounded, and gradation will be specified in the Specifications (Appendix C of the RD).

As discussed in Section 2.7.2 of the Preliminary RD, main channel backfill materials will consist of at least 1 foot of existing substrate similar to the existing sediments for cover material over excavated areas.

4.1.2 Aquatic Vegetation

Restoration of SAV is not planned in the main channel, given the dynamic nature of the environment, and will rely on upstream migration of SAV species to establish over time. Limited SAV plantings are planned for portions of low energy run habitat. Design Drawings showing proposed planting density are included in Appendix B of the Preliminary RD.

4.1.3 Shallow Emergent Marsh

Emergent species to be planted within the Shallow Emergent Marsh habitat will include native and commercially available emergent rhizome or plug bare root seedlings at the time of planting. Possible consideration may be given to use of wetland seed mix if restored grades indicate drier portions of planting areas can be protected from localized runoff and storm events. Based on the varying hydrology and water inundation levels found within this habitat, planting zones will be focused on species suitable at or below bankfull conditions and those suitable for above bankfull to below the 2-year recurrence interval. Specifications will focus on arrow arum and soft-stem bulrush within the inundated shoreline areas, as these exist currently based on PDI characterization results. Above bankfull conditions will include species adaptable to various hydrologic conditions, including rushes, sedges, and grass species. Suitable Shallow Emergent Marsh species are identified in Table A1-1 (Attachment A). Planting location of species will be based on restored grades and expected water depths to maximize survivability and functioning of restored habitats.

Backfill within this planting zone will consist of a 50/50 mix of sand and topsoil, as indicated on the Design Drawings. Specifications for sand and wetland topsoil will be presented in the Specifications (Appendix C of the RD).

These Shallow Emergent Marsh wetlands are currently dominated by common reed and provide limited habitat value. In areas outside RA boundaries, the existing floodplain and emergent wetland habitats are primarily disturbed and contain invasive plant species which impact the ability of native species to establish; subsequently, these disturbed areas provide less functional and valuable habitat to wildlife. Therefore, to provide increased diversity and functionality of this habitat, pre-remedial treatment may be performed through mechanical and herbicide applications to reduce the common reed.

4.2 Riparian Bank and Upland Restoration

PDI activities performed within the riparian habitats of the Subsite removal areas consisted primarily of Riparian Banks, with non-wetland floodplain habitats (i.e., early successional scrub-shrub) and Upland (i.e., Southern Successional Hardwood Forest). These adjacent areas to the regulated wetland and waters habitat were observed to be highly disturbed from presence of invasive and nuisance vegetation species with lower resource value. The planned restoration of these areas consists of establishing suitable and more diverse native plant communities to provide enhanced benefits to local wildlife species that may utilize these habitats.

4.2.1 Riparian Banks

As noted above in Section 4, the Riparian Bank restoration will utilize plantings and seed mixes adapted to hydrology found between the 2- and 5-year recurrence elevation contours for those species tolerant to varying degrees of seasonal inundation. It is anticipated that vegetation and bank disturbances will occur directly from removal activities as well as indirectly from equipment access roads and/or staging areas developed to facilitate the execution of the RA.

In general, restoration of bank areas disturbed for access will involve removal of road material, decompaction of the underlying soil, and placement of clean backfill and topsoil, as necessary, to restore the banks to their original grade. If topsoil is removed from the bank area to be restored, subsurface soil will be excavated to a minimum depth of 6 inches below the proposed final grade and 6 inches of new topsoil will be installed to create the final grade and to serve as the medium for plant establishment. If at least 6 inches of suitable topsoil remains on the bank following the removal of road materials, the existing topsoil surface shall be loosened to a depth of 2 to 4 inches prior to reseeding. Topsoil replaced on the bank will be as specified in the Specifications (Appendix C of the RD).

Upon completion of bank grading, the bank vegetation will be restored by seeding and planting with native species suitable for the hydrological setting. Trees and shrubs that are removed from the bank will be replaced with in-kind native species suitable for the hydrological setting. The quantity of replaced shrubs and trees will be equivalent to a density of 225 stems per acre; based on the average woody cover density found within the floodplain during PDI characterization. Herbaceous species will be seeded using a riparian mix adapted to variable hydrology, such as ERNMX-178 or equivalent. Tables A1-1 and A1-2 (Attachment A) detail the trees, shrubs, and herbaceous seed mix species proposed for this habitat restoration.

4.2.2 Upland Area Restoration

Soil removal activities performed within upland and non-wetland floodplain areas, identified as Southern Successional Hardwood Forest, will impact existing tree, shrub, and herbaceous vegetation communities found within the targeted soil excavations.

As specified in Section 2.7.1 of the Preliminary RD, soil removal areas will be backfilled with fill meeting the criteria set forth in the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 5 (NYSDEC 2010). Subsurface soil backfill material will be selected based on typical general fill materials provided in the New York State Department of Transportation Standard Specifications (2008). Surface soil to support vegetation restoration will be specified with 1 foot of topsoil meeting the specifications to be identified in the Specification (Appendix C of the RD).

Consistent with Section 4.2.1, trees and shrubs that are removed from upland and non-wetland floodplain will be replaced at a density of 225 stems per acre with species suitable for the hydrological setting. An upland seed mix will be used to establish a native herbaceous cover. Tables A1-1 and A1-2 (Attachment A) detail the trees, shrubs, and herbaceous seed mix species proposed for this habitat restoration.

4.3 Disturbed Forested Wetland Restoration

The excavated portion of the forested wetland will be backfilled with imported material similar to that required for the Shallow Emergent Marsh, as described in Section 4.1.3. Restoration of final grade to the pre-construction elevations will maintain the hydrologic interactions of forested wetland with the water table and surface runoff, as well as provide a suitable planting medium to restore a native trees and grasses in the forested wetland. A minimum of 1 foot of wetland topsoil will be placed to bring to restored grade. Consistent with Section 4.2.1, trees and shrubs that are removed from the forested wetland will be replaced at a density of 225 stems per acre with species suitable for the hydrological setting. A forested wetland seed mix (consisting of native plant species adapted to canopy shading will be sowed into the surface of the topsoil following standard specifications to be included in the Specifications (Appendix C of the RD). Tables A1-1 and A1-2 (Attachment A) detail the target native trees, shrubs, and forested wetland seed mix species proposed for this habitat restoration.

5 Monitoring and Maintenance of Restoration Activities

The monitoring and maintenance plan for restored habitats will be developed and evaluated throughout the RD process. The preliminary plan is provided in the following sections and details the planned monitoring and maintenance activities within restored habitats.

This section presents bank and floodplain vegetation and riverbank monitoring methods/timing, as well as the performance standards that will be used to evaluate monitoring results. Additionally, potential corrective actions to be implemented (if performance standards are not achieved) are included in this section.

In general, restoration will be completed in "Year 0" and the baseline number of trees, shrubs, and live stakes (i.e., woody vegetation) in each area will be established during the initial planting (i.e., in Year 0). "As-built" restoration will reflect baseline conditions for the performance monitoring and adaptive management and will be documented and submitted to USEPA as part of the post-construction closeout reporting. Each restored area (i.e., Phase 1 and Phase 2) will be monitored and maintained for up to 5 years (i.e., Years 1 through 5) to document establishment of the desired communities. The restoration sequence and schedule will be adapted and revised in real-time, as needed, but future monitoring is anticipated to commence the year following the completion of remediation construction and restoration at each area.

Monitoring and maintenance criteria and corrective actions described herein consider that restoration communities may take two to three years to mature, and the plan has been developed to avoid micromanagement during restoration monitoring to allow time for the ecosystem and habitat to reestablish naturally.

5.1 Vegetation Survival

Vegetation restoration areas will be monitored and maintained for up to 5 years following restoration to:

- Evaluate the status of the restoration relative to performance objectives.
- Identify the need for additional maintenance or corrective action (e.g., seeding, planting, exotic/invasive species control, regrading).

Qualitative and quantitative data, to be collected as described in the following subsections, will be reviewed to evaluate restoration conditions and identify circumstances that would warrant corrective action. Performance criteria will be used to evaluate the success of the completed restoration activities. If the completed restoration activities do not meet the performance criteria, then maintenance activities (presented Section 5.4) may be required to meet the performance criteria.

5.1.1 Performance Criteria

The following performance criteria will be used to evaluate the success of the completed restoration activities for Forested Wetland, Riparian Bank, and Upland areas outside the typical active channel and near-shore bank at the end of the 5-year monitoring period):

- Trees and Shrubs - 90% survival of native species

- Total vegetative cover (defined as ground and canopy cover):[1]
  - Increased cover after one growing season
  - 80% by Year 5
  - <10% ground cover of invasive plant species.[2]

The total vegetative cover is defined as the areal ground cover as viewed from a standing position and looking down and with consideration for canopy cover from the ground looking up. The average vegetative area cover will be calculated by averaging the percent vegetative cover of each monitoring location to define one percentage for the total area of the mitigation. As discussed further below, when evaluating achievement of the performance standards, counts and assessment of percent cover will include natural recruits of native species (i.e., volunteer growth). Achievement of vegetative cover performance standards will also be considered against original undisturbed vegetative cover conditions in specific areas as described by data acquired in the habitat assessment and as summarized in the PDI Report (Arcadis 2020).

The restoration of the Shallow Emergent Marsh planting areas is reliant on the re-establishment of hydrology influenced by the interaction of restored channel areas and corresponding bank elevations, as well as floodplain topography that ties to surrounding upland surface runoff. Targeted herbaceous and shrub species used in these planting areas are selected to span a range of hydrologic conditions and includes those species that require constant water inundation and those that may require seasonal water inundation to survive. Vegetation planted within the Shallow Emergent Marsh includes the installation of shrub species (planted as 1-gallon container stock or live stakes) and emergent wetland species planted primarily as seedlings (via plug installations), with possible consideration to seed mix application at higher elevations within the planting area. Based on the potential for disturbance from flow events in these areas, monitoring and maintenance requirements will focus on restored grade elevations necessary to support successful development of planned native plant communities. Planted areas that are established to be permanently inundated (i.e., open water) through shallow shoreline grading with Ley Creek restored channel and banks will not be subject to assessment of total vegetative cover. Total vegetative cover will be assessed in planting areas that may be seasonally inundated. For these planting areas, a total vegetative cover performance criterion of 75 percent by Year 5 of monitoring will be targeted. Channel and bank morphology adjacent to these Shallow Emergent Marsh planting areas may require maintenance to maintain suitable hydrologic connections if significant sedimentation or localized scouring occurs.

Due to the expected lower success rate of any woody or aquatic vegetation planted in the Shallow Emergent Marsh, one replanting only will be performed, as necessary, for vegetation installed in these areas that succumbs to undesirable growth or mortality. Vegetation planted within the active channel includes the installation of SAV (via tuber seedlings installations) and will not be quantitatively monitored.

5.1.2 Annual Considerations

Annual considerations for monitoring and maintenance for trees, shrubs, and herbaceous vegetation will be developed to allow for an adaptive management structure and decision-making process to facilitate potential changes to post-construction conditions to meet performance criteria at the end of the monitoring period. This may initially include several site visits to inspect restored areas for drainage, stability, and planting survival to

[1] Specific to plant communities that will be seeded as detailed within this Habitat Restoration Plan based on assumed hydrologic conditions.
[2] As defined in the New York State Prohibited and Regulated Invasive Plants, published by the NYSDEC and the New York State Department of Agriculture and Markets in September 10, 2014 (NYSDEC 2014).

determine whether any immediate corrective actions are required. During the site visits, any potential corrective actions (e.g., excessive species mortality, adjustment to best management practices for runoff or erosion protection near planting areas) would be documented for assessment and potential implementation by the Site Contractor. Additional details on the annual monitoring are provided below in Section 5.2.

5.1.3 Monitoring Methods

An "as-built" plan will be completed following restoration and mitigation activities. These as-built plans will be used as the baseline for the compliance monitoring program. Boundaries of vegetation community types present in the restoration area will be identified and mapped on the plan, as well as a complete final accounting of plants installed within each planting area.

Monitoring/inspection events will be conducted twice annually (spring and late summer) during low-flow conditions, to the extent practicable, to provide an assessment of tree and shrub survival and ground cover establishment. The spring event (typically April or May) will consist of qualitative monitoring of the restored areas to identify potential problems early in the growing season. The late summer (typically August or September) monitoring event will consist of the collection of quantitative and qualitative data regarding vegetative species composition, invasive species presence, wildlife use, and effectiveness of the soil stabilization techniques. All work will be directed by a Restoration Ecologist familiar with the RD and the monitoring and maintenance goals established in the Final RD.

The spring qualitative event will be focused on identifying any erosion control issues (if they exist) associated with restored channel and/or channel banks, significant tree or shrub mortality over the winter, as well as presence of non-native invasive species that could establish within the restored area. Planted and/or seeded vegetation will be evaluated for general health, and identification of any signs of stress (i.e., herbivory, drought). Photographs will be taken at approximately 40 permanently established locations at pre-determined cardinal directions. The preliminary locations will be added to figures for inclusion in future iterations of this Habitat Restoration Plan. If final locations are not associated with permanent site features (e.g., monitoring well, utility pole), they will be demarcated with a 6-foot-high green metal fence post (if permitted by the property owner), and will be surveyed with a sub-meter accurate global positioning system (GPS) unit. GPS positions and final monitoring locations will be provided as part of the baseline monitoring report (Year 1).

The late summer quantitative event will be focused on data collection necessary to evaluate achievement of performance criteria. Specifically, the event will include the following:

- Assessment of tree and shrub plantings within the restored habitats will utilize permanent sample plots to assess performance criteria. Planted trees (i.e., those with 2-inch diameter at breast height or larger) and shrubs (i.e., those equal to or greater than 18 inches in height) will be individually counted during monitoring events within each sample plot to assess overall survival across all restored areas. Volunteer (i.e., natural recruits) tree and shrub species meeting these minimum size requirements will also be included within the plot counts. Further description of the permanent sample plots is described below.

  Permanent sample plots will be established to subsample the tree and shrub counts for the entire restored area. The sample plots will cover a minimum of 20 percent of the overall restored area and will be either 1/10-acre (radius 37.3 feet) or 1/100-acre (radius 11.7 feet) circular plots. The size and location of the plot will be determined by final restoration boundaries and at the discretion of the Restoration Ecologist managing the final planting. These locations will be demarcated with a permanent site feature (e.g., monitoring well, utility pole) or a post (e.g., a 6-foot-high green metal fence post, or similar, if permitted), and surveyed with a sub-

meter accurate GPS unit. GPS positions and final monitoring locations will be provided as part of annual monitoring reports, as needed. Within each sample plot, the following measurements will be taken annually:

- Total vegetative cover
- Total tree cover
- Total shrub cover
- Total herbaceous cover
- Identification of all trees and shrubs within plot
- Percent cover of all tree and shrub species
- Height of all trees and shrubs within plot
- Observations of stress or herbivory.

- Quantitative assessment of herbaceous understory within the restored habitats will be performed using randomly placed 1-meter by 1-meter sample quadrats nested within the circular plots described above. This will include a minimum of five sample quadrats within each type of restored planting area. Additional quadrats may be warranted based upon a species area curve specific to the respective community type. Within each quadrat, the following measurements will be taken annually:
  - Total percent vegetative cover
  - Cover class measurements of all species within quadrat to assess presence of native and potential invasive species
  - General cover type characterization (i.e., cover percent estimations for various cover types such as vegetation, bare soil, open water, woody debris, rock, other)
  - Identification of predominant species within quadrat
  - Average and maximum height of vegetation within quadrat
  - Observations of stress or herbivory
  - Qualitative characterization of soil moisture (i.e., depth of surface water, saturated to surface, water-stained leaves).
- Quantitative assessment of shrubs (container stock) and emergent vegetation restored within the Shallow Emergent Marsh planting area will be conducted using sample plots to represent the entirety of the restored area. Monitoring for the percent cover of the shrubs (container stock) and emergent vegetation will be performed during typical mean baseflow conditions. Based on the nature of the disturbance areas and type of vegetation installations (shrubs (container stock) and emergent vegetation plugs), fixed sample plots will be used for the assessment. Nested 1-meter by 1-meter sample quadrats within the circular plots will be established to subsample the shrub counts for the entire restored area. Emergent vegetation plugs will not be counted individually but will be included as part of the overall herbaceous cover assessed within each plot. The plots will cover a minimum of 20 percent of the overall area and will be approximately 1/100-acre (radius 11.7 feet) circular plots. The exact location of the plots will be determined by final restoration boundaries and will be positioned at random locations throughout the restoration area at the discretion of the Restoration Ecologist managing the final planting. The centers of the plots will be surveyed with a sub-meter accurate GPS unit; however, no permanent demarcations will be installed. GPS positions and final monitoring locations will be provided as part of the annual monitoring reports, as needed. Within each plot, the following measurements will be taken:

- Total percent vegetative cover
- General cover type characterization (i.e., cover percent estimations for various cover types such as vegetation, open water, exposed rock, other)
- Observations of stress or herbivory.

All cover class measurements will be recorded using cover class midpoints as shown below in Table A2.

Table A2. Mid-Point Cover Classes

Percent Cover Range (%)	Cover Class Mid-Point
<1	0.5
1 to 5	3
6 to 15	10.5
16 to 25	20.5
26 to 50	38
51 to 75	63
76 to 95	85.5
>95	98

Each permanent plot and quadrat will be photo documented. In addition, photographs will be taken at each of the permanently established photo-documentation points described above.

During the annual quantitative monitoring events, the quantity of observed trees and shrubs (i.e., woody vegetation) will be tallied. Tree and shrub counts and assessment of percent cover for herbaceous growth and vegetation will include natural recruits of native species (i.e., volunteer growth).

Vegetation conditions/quantity will be documented in the field via the Monitoring Inspection Checklist and associated monitoring summary table (an example is included in Attachment A2).

5.2 Creek Bank Stability

Bank stability of restored areas will be assessed to determine the need for and/or extent of potential maintenance activities. Qualitative creek bank stability monitoring will be performed for up to 5 years concurrently with each of the vegetation monitoring events (i.e., in spring and summer). Additionally, qualitative creek bank stability monitoring will be performed after a 25-year, 24-hour storm event, which is estimated to be determined by more than 4.12 inches of rainfall in a 24-hour period at the Syracuse Hancock International Airport National Oceanic and Atmospheric Administration (NOAA) station (NOAA 2021). During the creek bank inspection, restored riverbanks will be visually inspected for the following:

- Evidence of significant erosion (e.g., undercutting, lateral erosion above rock protection, exposed geotextile fabric, erosion down the face of the bank from surface runoff)

- Areas where excessive settlement has occurred relative to the surrounding areas
- Drainage problems.

Additionally, during the summer quantitative vegetation monitoring event, creek bank stability monitoring will include evaluation through use of Rosgen's (2001) BEHI field assessment methodology. Measurements of vegetative cover, rooting depth, bank angle, bank height, etc. at each select transects will be taken to estimate existing condition and susceptibility to erosion and used to compare to conditions found during the PDI, as documented in the PDI Report (Arcadis 2020) and summarized in Section 2.3.2. If the range of conditions found in the BEHI assessment are below those found in the PDI or there are significant observed failures, then these findings would be used to identify suitable corrective actions.

A total of 16 transects along the restored banks will be monitored (i.e., approximately one per 500 linear feet of restored channel), and the preliminary locations will be added to figures for inclusion in future iterations of this Habitat Restoration Plan. If final locations are not associated with permanent site features (e.g., monitoring well, utility pole), they will be demarcated with a 6-foot-high green metal fence post (if permitted by property owners), and will be surveyed with a sub-meter accurate GPS unit. GPS positions and final monitoring locations will be provided as part of the baseline monitoring report (Year 1).

Creek bank areas observed to show signs of these stability inspection elements will be noted on the Monitoring Inspection Checklist and monitoring summary table (an example is included in Attachment A2).

5.3 Maintenance Activities and Corrective Actions

The process of adaptive management will be used to monitor and maintain the completed restoration. This proactive management strategy uses information gathered over time to identify successful management practices and identify opportunities for improvement that will help to achieve the restoration objectives. As such, routine monitoring is an important component of adaptive management. Information collected during monitoring events provides a means to identify and build on effective management practices and to develop recommendations to modify ineffective practices and implement corrective actions. These may include observations of vegetation mortality, excessive presence of invasive species, or potential climatic conditions (e.g., drought or significant storm flow events) that necessitate a corrective action.

For corrective actions to address tree or shrub mortality, "equivalent species" that show greater survivability may be favored for replacement plantings (compared to the plant species originally specified) to improve long-term survivability of the vegetation within the restored area(s). Although restoration plant species were selected based on the anticipated hydrologic conditions, some plant species exhibit better survival for undetermined reasons (i.e., genetics, variable quality stock, non-palatability to herbivores, etc.). During monitoring activities, observations of species-specific survival characteristics in the various habitats will assist in the design of the replanting efforts, if needed.

As part of the adaptive management approach, signage and/or passive barriers will be considered to protect the restoration features, if observations during monitoring events indicate such barriers or signage are warranted. Such controls may remain in place through the 5-year monitoring period.

Implementation of an exotic/invasive species control plan is an essential component of restoration project maintenance. Control of exotic/invasive species will be accomplished through an integrated approach that may include the use of mechanical, chemical, and biological methods, as appropriate. The methods and techniques chosen to manage a particular species will be a function of the target plant's life history, level of infestation, and

site-specific conditions that may preclude or exclude a particular method or technique. Herbicide application as part of the exotic/invasive species control program will be conducted by a licensed applicator. Additionally, application will only be in terrestrial areas and herbicides will not be applied to bodies of water without pre-approval of an Aquatic Pesticide Permit, pursuant to NYCRR 327. Notification and treatment area posting requirements identified in NYCRR Parts 325 and 327 will be followed as applicable. Consultation with USEPA will be made to develop a suitable exotic/invasive species control plan, as necessary.

The RD Respondents will propose, via an email correspondence, corrective actions (if necessary) for USEPA review and approval prior to implementation and within 30 days of completing the spring and/or summer monitoring event. Corrective actions may include but will not be limited to: planting alternate vegetation species; re-grading, additional soil amendment, implementing a watering plan; herbicide application or other mechanical control of invasive/exotic species; and installation of additional armoring or other bank stability measures to address conditions that could jeopardize the performance of the completed remediation action. If warranted, additional seeding/planting will be implemented in the spring or fall, and exotic/invasive species will be controlled at the most suitable time for target species. Corrective actions taken will be documented in the Annual Monitoring Report (discussed in Section 5.4).

5.4 Reporting

Qualitative and quantitative monitoring data collected during routine monitoring events will be evaluated to develop appropriate recommendations for the restoration project.

Monitoring data, recommendations, and corrective actions taken (if necessary), will be included in an annual monitoring report produced following completion of the late summer/early fall monitoring event each year. The report will be submitted to the USEPA by December 31. Objectives for an annual monitoring report are as follows:

- Quantitatively assess the vegetative cover throughout the restoration and mitigation areas.
- Illustrate progress toward, or deviation from, stipulated monitoring criteria as defined by the monitoring and maintenance plan.
- Provide the USEPA with suitable information to evaluate the existing condition of the Subsite.
- If necessary, identify mitigative actions to move or maintain progress toward stipulated monitoring criteria.

A typical annual monitoring report will include the following sections to best describe existing conditions and progress towards defined performance criteria:

- An introduction, including a summary of the performance criteria and objectives of the annual monitoring events.
- Brief summary of the observations made during the quantitative (spring) monitoring event still relevant to describe the Subsite condition.
- Summary of the methods used to compete the quantitative (summer) monitoring event.
- Summary of the observations made during the monitoring activities, including the quantitative assessment of the vegetative cover throughout the restoration area and a comparison to "as-built" conditions and defined performance criteria.
- Figures illustrating the monitoring quadrants observed, the location of any key observations made, and photograph locations/direction.

- Photograph log depicting the conditions observed during the monitoring event. Photographs will have captions describing the location and direction of photograph.
- Completed Monitoring Inspection Checklist and associated summary tables to support the required performance standard calculations.
- Summary of the corrective actions or adaptive management actions implemented throughout the year, if any, including photographs and figures noting the location(s) of plantings. If herbicide is used, a summary of location(s) of application, application rate, and type of herbicide used.
- Discussion of progress toward, or deviation from, the performance criteria as defined in this Habitat Restoration Plan, and if necessary, corrective actions to move or maintain progress toward the performance criteria.
- Planned monitoring activities and/or recommendations for the following inspections (spring and later summer recommendations separately, if appropriate), if any.

6 References

Arcadis. 2020. Pre-Design Investigation Data Summary Report (Revised) – Lower Ley Creek Subsite, Operable Unit 25 of the Onondaga Lake Superfund Site, City of Syracuse/Town of Salina, Onondaga County, New York. December.

Cowardin, L.M., V. Carter V., F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service Report No. FWS/OBS/-79/31. Washington D.C.

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. US Army Engineer Waterways Experimentation Station. Vicksburg, MS.

NYSDEC. 1995. Freshwater Wetlands Delineation Manual.

NYSDEC. 2010. DER-10 Technical Guidance for Site Investigation and Remediation.

NYSDEC. 2014. New York State Prohibited and Regulated Invasive Plants. New York State Department of Environmental Conservation and the New York State Department of Agriculture and Markets. September 10.

New York State Department of Transportation. 2008. Standard Specifications. Office of Engineering, Albany, New York. May 1, 2008.

NOAA. 2021. Weather observations for Syracuse, Syracuse Hancock International Airport. Available online at: https://w1.weather.gov/data/obhistory/KSYR.html.

Rosgen, D.L. 2001. A Practical Method of Computing Streambank Erosion Rate. Proceedings of the 7th Federal Interagency Sedimentation Conference, Vol. 2, pp. 9-15, March 25, 2001, Reno, NV.

USACE. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region Version 2.0, ed. MS: U.S. Army Engineer Research and Development Center.

USDA. 1998. Stream Visual Assessment Protocol. Natural Resources Conservation Service. National Water and Climate Center Technical Note 99-1.

USDA. 2019. Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service. Last Modified July 31, 2019. Available online at: https://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

USEPA. 2014. Record of Decision. Lower Ley Creek Sub-site of the Onondaga Lake Superfund Site, City of Syracuse/Town of Onondaga County, New York. September.

USEPA. 2016. Remedial Design Statement of Work – Onondaga Lake Superfund Site, Operable Unit 25 – Lower Ley Creek. July.

USFWS. 2021. National Wetlands Inventory Wetlands Mapper. Available online at: https://www.fws.gov/wetlands/Data/Mapper.html. Data last modified May 1, 2021.

Figures

(Not included in e-mailed PDF)

Attachment A1

Conceptual Planting Design

Table A1-1. Planting Scheme for Removal Area Habitats

Table A2-1. Seed Mix Specifications for Removal Area Habitats

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Table A1-1 - Planting Scheme for Removal Area Habitats

Scientific Name	Common name	Stratum	Wetland Indicator	Material Type	Habitat Types						
					Aquatic Bed	Shallow Emergent Marsh		Riparian Bank / Floodplain	Forested Wetland	Upland	Maintained Lawn
						Intertidal Shoreline	Above Bankfull				
Salix nigra	Black willow	Tree	FACW	7 gallon stock				x	x		
Celtis occidentalis	Hackberry	Tree	FACU	7 gallon stock						x	
Prunus serotina	Black cherry	Tree	FACU	7 gallon stock						x	
Platanus occidentalis	Sycamore	Tree	FACW	2 inch caliper				x			
Acer rubrum	Red maple	Tree	FAC	2 inch caliper				x			
Acer saccharinum	Silver maple	Tree	FACW	2 inch caliper				x	x		
Quercus palustris	Pin oak	Tree	FACW	2 inch caliper				x	x		
Cornus racemosa	Gray dogwood	Shrub	FAC	1-gallon				x			
Viburnum dentatum	Arrowwood	Shrub	FAC	1-gallon						x	
Aronia melanocarpa	Black chokeberry	Shrub	FAC	1-gallon				x			
Cephalanthus occidentalis	Buttonbush	Shrub	OBL	1-gallon (or live stake)			x				
Amerlanchier arborea	Serviceberry	Shrub	FACU	1-gallon						x	
Cornus amomum	Silky dogwood	Shrub	FACW	1-gallon (or live stake)			x	x	x		
Cornus sericea	Red-osier dogwood	Shrub	FACW	1-gallon (or live stake)			x	x	x		
Salix sericea	Silky willow	Shrub	OBL	1-gallon (or live stake)		x					
Sparganium americanum	American bur-reed	Herbaceous	OBL	plug or bare root/peat pot		x					
Peltandra virginica	Arrow arum	Herbaceous	OBL	plug or bare root/peat pot		x					
Iris versicolor	Blue flag	Herbaceous	OBL	plug or bare root/peat pot		x					
Pontederia cordata	Pickerelweed	Herbaceous	OBL	plug or bare root/peat pot		x					
Saururus cernuus	Lizard's tail	Herbaceous	OBL	plug or bare root/peat pot		x					
Schoenoplectus tabernaemontani	Softstem bulrush	Herbaceous	OBL	plug or bare root/peat pot		x					
Polygonum amphibian	Water smartweed	Herbaceous	OBL	plug or bare root/peat pot		x					
Calamagrostis canadensis	Canadian blue joint	Herbaceous	FACW-	plug or bare root/peat pot			x				
Lobelia cardinalis	Cardinal flower	Herbaceous	FACW+	plug or bare root/peat pot			x				
Glyceria striata	Fowl mannagrass	Herbaceous	OBL	plug or bare root/peat pot			x				
Carex vulpinoidea	Fox sedge	Herbaceous	OBL	plug or bare root/peat pot			x				
Carex lurida	Lurid sedge	Herbaceous	OBL	plug or bare root/peat pot			x				
Leersia oryzoides	Rice cutgrass	Herbaceous	OBL	plug or bare root/peat pot			x				
Juncus effusus	Soft rush	Herbaceous	OBL	plug or bare root/peat pot			x				
Eupatoriadelphus maculatus	Spotted joe-pye weed	Herbaceous	FACW+	plug or bare root/peat pot			x				
Vallisneria americana	American eelgrass	Herbaceous	OBL	tuber	x						
Elodea canadensis	Canadian waterweed	Herbaceous	OBL	tuber	x						
Seed Mixes											
Riparian Bank (ERNMX-178 or equivalent riparian bank mix)								x			
Forested Wetland (ERNMX-137 or equivalent for shaded OBL-FACW areas)									x		
Upland (ERNMX-156 or equivalent for upland floodplain areas)										x	
Maintained Lawn Seed Mix (ERNNX-113 or equivalent for areas turf restoration)											x

Notes:

1. Tree and shrub planting density will be 225 stems per acre, based on existing site conditions found through pre-design investigation activities.
2. Trees will be a minimum of 6 feet tall and shrubs will be a minimum of 18 inches tall for installation.
2. Herbaceous aquatic species for Shallow Emergent Marsh habitats may need to be specified for minimum supplier height, depending upon the water depth zone.

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Table A1-2 - Seed Mix Specifications for Removal Area Habitats

Specialized Wetland Mix for Shaded OBL-FACW Areas (Forested Wetlands)

SCIENTIFIC NAME	COMMON NAME	PERCENT BY WEIGHT
Carex vulpinoidea	Fox Sedge	35.0%
Elymus virginicus	Virginia Wild Rye	20.0%
Carex scoparia	Blunt Broom Sedge	15.0%
Carex lurida	Lurid Sedge	12.8%
Carex lupulina	Hop Sedge	5.0%
Verbena hastata	Blue Vervain	4.0%
Heliopsis helianthoides	Oxeye Sunflower	2.0%
Carex intumescens	Star Sedge	1.0%
Sparganium americanum	Eastern Bur Reed	1.0%
Iris versicolor	Blueflag	0.7%
Bidens cernua	Nodding Bur Marigold	0.5%
Carex crinita	Fringed Sedge	0.5%
Carex stipata	Awl Sedge	0.5%
Eupatorium perfoliatum	Boneset	0.5%
Scripus cyperinus	Woolgrass	0.5%
Vernonia noveboracensis	New York Ironweed	0.5%
Lobelia siphilitica	Great Blue Lobelia	0.3%
Penthorum sedoides	Ditch Stonecrop	0.2%

20 lb per acre with a cover crop. For a cover crop use one of the following: grain rye (1 Sep to 30 Apr; 30 lbs/acre), Japanese millet (1 May to 31 Aug; 10 lbs/acre), or barnyard grass (1 May to 31 Aug; 10 lbs/acre).

ERNMX-137

Bank Seed Mix (For Riparian Banks)

SCIENTIFIC NAME	COMMON NAME	PERCENT BY WEIGHT
Panicum clandestinum	Deertongue	30.0%
Elymus virginicus	Virginia Wild Rye	20.0%
Andropogon gerardii	Big Bluestem	11.8%
Sorghastrum nutans	Indiangrass	10.5%
Panicum virgatum	Switchgrass	5.0%
Chamaecrista fasciculata	Partridge Pea	4.0%
Verbena hastata	Blue Vervain	4.0%
Juncus effusus	Soft Rush	3.0%
Rudbeckia hirta	Blackeyed Susan	3.0%
Heliopsis helianthoides	Oxeye Sunflower	2.0%
Asclepias incarnata	Swamp Milkweed	1.0%
Aster novae-angliae	New England Aster	0.7%
Aster umbellatus	Flat Topped White Aster	0.7%
Eupatorium perfoliatum	Boneset	0.7%
Agrostis perennans	Autumn Bentgrass	0.5%
Helenium autumnale	Common Sneezeweed	0.5%
Monarda fistulosa	Wild Bergamot	0.5%
Vernonia noveboracensis	New York Ironweed	0.5%
Pycnantheumum tenuifolium	Narrowleaf Mountainmint	0.4%
Solidago patula	Roughleaf Goldenrod	0.4%
Eupatorium fistulosum	Joe Pye Weed	0.3%
Lobelia siphilitica	Great Bloe Lobelia	0.3%
Aster puniceus	Purplestem Aster	0.2%

Application rate of 20 to 30 lbs per acre; with cover crop. 100.0%

ERNMX-178 or equivalent riparian bank mix

Table A1-2 - Seed Mix Specifications for Removal Area Habitats

Upland Seed Mix

SCIENTIFIC NAME	COMMON NAME	PERCENT BY WEIGHT
Festuca ovina	Sheep Fescue	73.2%
Lolium multiflorum	Annual Ryegrass	17.0%
Chrysanthemum maximum	Shasta Daisy	3.0%
Coreopsis lanceolata	Lanceleaf Coreopsis	2.0%
Rudbeckia hirta	Blackeyed Susan	2.0%
Achillea millefolium	Common Yarrow	0.6%
Acsclepias tuberosa	Butterfly Milkweed	0.5%
Chamaecrista fasciculata	Partridge Pea	0.3%
Eupatorium coelestinum	Mistflower	0.3%
Rudbeckia fulgida var. fulgida	Orange Coneflower	0.3%
Penstemon hirsutus	Hairy Beardtongue	0.2%
Pycnantheumum tenuifolium	Narrowleaf Mountainmint	0.2%
Aster oblongifolius	Aromatic Aster	0.1%
Aster prenanthoides	Zigzag Aster	0.1%
Baptisia tinctoria	Yellow False Indigo	0.1%
Tradescantia virginiana	Virginia Spiderwort	0.1%

Application rate of 20 to 40 lbs per acre 100.0%
ERNMX-156 or equivalent for upland floodplain areas.

Grass Planting Area Seed Mix (For Upland Laydown Areas that Require Turf for Restoration)

SCIENTIFIC NAME	COMMON NAME	PERCENT BY WEIGHT
Festuca rubra	Creeping Red Fescue	25.0%
Lolium multiflorum	Annual Ryegrass	25.0%
Lolium perenne, 'Amazing A+'	Perennial Ryegrass, "Amazing A+' (turf type)	25.0%
Lolium perenne, 'Confetti III'	Perennial Ryegrass, "Confetti III' (turf type)	25.0%

Application rate of 60 to 80 lbs per acre
ERNMX-113 or equivalent perennial ryegrass and fescue turf mix

Attachment A2

Example Field Forms

Bi-Annual Monitoring Inspection Checklist
Onondaga Lake Superfund Site, Operable Unit 2B - Lower Ley Creek

I. GENERAL INFORMATION

Inspection Date: _____
Conducted By: _____
Weather Conditions: _____

II. INSPECTION SUMMARY

1. Vegetation

A. Woody Vegetation *(Note evidence of damage from trespassing or herbivory, note physical changes since last inspection. If a quantitative assessment is performed, complete the attached field form for each planting area.)*

B. Herbaceous Vegetation *(Note evidence of areas of bare/sparse vegetation; note any damage from trespassing or herbivory; note any physical changes since last inspection. If a quantitative assessment is performed, complete the attached field form for each planting area.)*

C. Presence of Invasive Species *(Note the invasive species present. If a quantitative assessment is performed, complete the attached field form for each planting area.)*

D. Vegetation below water line *(Note evidence of damage from trespassing or herbivory, note physical changes since last inspection. If a quantitative assessment is performed, complete the attached field form for each planting area.)*

2. Riverbank Stability *(Note any physical changes since last inspection; note evidence of significant erosion [e.g., slope failure, ruts, gullies, washouts, or sloughing]; note other conditions that could jeopardize the performance of the completed remediation actions. If a quantitative assessment is performed, complete the attached field form for each transect.)*

3. Other Observations *(Confirm that repair/maintenance activities identified during prior inspection, if any, have been performed; note any other general observations.)*

III. FOLLOW UP MAINTENANCE AND REPAIR ACTIVITIES

ATTACH ADDITIONAL INFORMATION AS APPROPRIATE

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Summary of Quantitative Vegetation Assessment - Trees ≥ 2-inch DBH (Year 5 [example])
Onondaga Lake Superfund Site, Operable Unit 25 – Lower Ley Creek

Analysis by: _____
Date(s) of Monitoring: _____

Planting Area	Drawing Reference	Trees (≥ 2-inch DBH)			
		# Planted	# Counted	% Survival	> 90% Survival?
Riparian Bank Planting Area	C-XXX				
	C-XXX				
	C-XXX				
	Total				
Floodplain Planting Area	C-XXX				
	C-XXX				
	C-XXX				
	C-XXX				
	C-XXX				
	Total				
Upland Planting Area	C-XXX				
	C-XXX				
	C-XXX				
	Total				

Note:
1. DBH = diameter breast height.

Summary of Quantitative Vegetation Assessment - Sample Plots (Year 5 [example])
Onondaga Lake Superfund Site, Operable Unit 25 – Lower Ley Creek

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Analysis by: _____
Date(s) of Monitoring: _____

Planting Area	Sample Plot No. (if applicable)	Trees				Shrubs				Herbaceous Ground Cover		"Other" Invasive Species	
		# Planted	# Counted	% Survival	Performance Criteria Met?	# Planted	# Counted	% Survival	Performance Criteria Met?	% Cover	Performance Criteria Met?	% Cover	Performance Criteria Met?
Shallow Emergent Marsh	TBD	NA	NA	NA	NA	NA	NA	NA	NA				
	TBD	NA	NA	NA	NA	NA	NA	NA	NA				
	Average												
Riparian Bank	TBD												
	TBD												
	Average												
Floodplain	TBD												
	TBD												
	Average												
Forested Wetland	TBD												
	TBD												
	Average												
Upland	TBD												
	TBD												
	Average												
Other - Maintained Field / Grass	TBD	NA	NA	NA	NA	NA	NA	NA	NA				
	TBD	NA	NA	NA	NA	NA	NA	NA	NA				
	Average												

Notes:
1. NA indicates "not applicable".
2. Note, for "prohibited" invasive species, % cover applies to the entire site, not only the sample plots.

Summary of Quantitative Bank Stability Assessment (Year 5 [example]) - BEHI [1]
Onondaga Lake Superfund Site, Operable Unit 2S – Lower Ley Creek

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Analysis by: _____ Latitude: _____ Photo(s): _____
Date of Monitoring: _____ Longitude: _____

	A		B		C		D		E	
BEHI category	Bank height	BH score	Root depth	RDH score	Root density	RD score	Surface protection	SP score	Bank angle	BA score
Very low	1.0 - 1.1	1	90 - 100	1	80 - 100	1	80 - 100	1	0 - 20	1
Low	1.1 - 1.2	3	50 - 89	3	55 - 79	3	55 - 79	3	21 - 60	3
Moderate	1.3 - 1.5	5	30 - 49	5	30 - 54	5	30 - 54	5	61 - 80	5
High	1.6 - 2.0	7	15 - 29	7	15 - 29	7	15 - 29	7	81 - 90	7
Very high	2.1 - 2.8	8.5	5 - 14	8.5	5 - 14	8.5	10 - 14	8.5	91 - 119	8.5
Extreme	> 2.8	10	< 5	10	< 5	10	< 14	10	> 119	10

Material adjustment (F)	
Bedrock - automatically	Very low
Boulder - automatically	Low
Cobble	(-) 10
Gravel or mostly gravel	(+) 5
Sand or mostly sands	(+) 10
Silt/loam	No adjustment
Clay	(-) 20

Stratification adjustment (G)	
No layer	No adjustment
Single layer	(+) 5
Multiple layers	(+) 10

Total Score (Sum A-G)

BEHI Category: _____

Very low	Low	Moderate	High	Very high	Extreme
≤ 9.5	10 - 19.5	20 - 29.5	30 - 39.5	40 - 45	> 45

Site Description / Comments:

Notes:

1. Bank Hazard Erosion Index (BEHI), from Rosgen, D.L. 2001. A Practical Method of Computing Streambank Erosion Rate. Proceedings of the 7th Federal Interagency Sedimentation Conference, Vol. 2, pp. 9-15, March 25, 2001, Reno, NV. Available on the Wildland Hydrology website at: https://wildlandhydrology.com/resources/docs/Assessment/Rosgen_2001_Channel_Stability.pdf

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Appendix B

Preliminary Design Drawings

(Not included in e-mailed PDF)

Appendix C

List of Proposed Specifications

LIST OF PROPOSED SPECIFICATIONS

Division 00 – Procurement and Contracting Requirements

00 01 10	Summary of Work

Division 01 – General Requirements

01 11 00	Summary of Work
01 14 00	Work Restrictions
01 15 00	Contractor's Project Operations Plan
01 26 00	Contract Modification Procedures
01 29 76	Progress Payment Procedures
01 30 53	Security
01 31 00	Project Management and Coordination
01 32 00	Construction Progress Documentation
01 33 00	Submittal Procedures (and Attachment A Submittal Register)
01 35 29	Health, Safety, and Emergency Response Procedures
01 35 43.13	Environmental Procedures for Hazardous Materials
01 35 43.18	Sustainability Requirements
01 35 49	Community Air Monitoring Plan
01 41 26	Storm Water Pollution Prevention Plan
01 51 00	Temporary Utilities and Facilities
01 53 53	Temporary Water Treatment and Management
01 55 00	Temporary Access Roads and Parking
01 57 00	Temporary Controls
01 58 13	Temporary Project Signage
01 71 23	Field Engineering
01 71 23.16	Construction Surveying
01 71 33	Protection of Adjacent Construction
01 74 00	Cleaning and Waste Management
01 77 00	Closeout Procedures

Division 02 – Existing Conditions

02 21 19	Structural Surveys
02 51 00	Decontamination
02 61 15	Handling and Disposal of Impacted Materials

Division 31 – Earthwork

31 05 16	Aggregate for Earthwork
31 05 19	Geosynthetics for Earthwork
31 09 13	Geotechnical Instrumentation and Monitoring
31 10 00	Site Clearing and Grubbing
31 23 16	Soil Excavation
31 23 23	Soil Backfill and Capping

Division 32 – Exterior Improvements

32 90 00	Plantings and Restoration

Division 35 – Waterway and Marine Construction

35 24 00	Dredging
35 43 00	Sediment Backfill and Capping

Appendix D

Preliminary Transportation and Non-Local Disposal Plan

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Respondents to Administrative Order on Consent for Remedial Design

Preliminary Transportation and Non-Local Disposal Plan

Lower Ley Creek Subsite, Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina
Onondaga County, New York

Superfund Site ID: NYD986913580

December 2021

Preliminary Transportation and Non-Local Disposal Plan

Lower Ley Creek Subsite, Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina
Onondaga County, New York

December 2021

Prepared By:
Arcadis of New York, Inc.
110 West Fayette Street, Suite 300
Syracuse
New York 13202
Phone: 315 446 9120

Prepared For:
Respondents to Administrative Order on Consent for Remedial Design

Our Ref:
B0035101.0001 / 30059709

Contents

Figures

1 Introduction

In accordance with the United States Environmental Protection Agency's 2016 Remedial Design Statement of Work (RD SOW) for the Onondaga Lake Superfund Site, Operable Unit 25 – Lower Ley Creek (the Subsite), the primary purpose of this Transportation and Non-Local Disposal Plan (TDP) is to:

- Propose routes for offsite shipment of waste material generated during the remedial action (RA).
- Identify communities affected by shipment of waste material generated during the RA.
- Describe plans to minimize impacts on affected communities.

The transportation controls and traffic management proposal presented in this TDP also apply to traffic related to trucks hauling import material onsite and other large construction vehicles delivering project-related equipment or materials during the removal activities, in addition to hauling removed material offsite for non-local disposal. The Subsite is located between U.S. Route 11 and Interstate 81 in Syracuse, New York.

1.1 Proposed Routes

The term "transporter" means the transporter of solid and liquid waste offsite, haulers of material or equipment onsite, and/or large construction vehicles, and the Remediation Contractor if/when the transporter is subcontracted to the Remediation Contractor. All transporters leaving the Subsite to transport waste material generated during the RA to non-local disposal facilities will follow the primary truck routes, as shown on Figures D1 through D3. The Contractor will provide all transporters with a copy of Figures D1 through D3 depicting the primary truck route to and from the Subsite. Trucks entering the site will generally follow the same routes in reverse.

Within the Subsite, trucks will operate on the established gravel access road(s). Trucks will continue along the gravel access road to the truck loading area within the temporary support/staging area. If a truck is already being loaded and a second truck arrives, that truck will be staged behind the first truck on the gravel access road unless blocked by the loading operation. In that case, the empty truck will be staged along a public route enroute to the Subsite. However, trucks will be staged on access roads rather than on public roadways whenever possible. Staged trucks will be parked such that they minimize interference with traffic on public roads. During wet or wintery conditions, trucks will not be pulled too far onto the shoulder, to avoid rutting. While staged, trucks will deploy warning triangles/cones along the sides, rear, and front of the parked vehicles.

1.2 Affected Communities

The Subsite is in close proximity to Interstate 81 and surrounded by industrial and commercial properties. Additionally, an existing trucking facility operates off 7th North Street, adjacent to the Subsite. The infrastructure and communities in this area are unlikely to be affected by the additional truck traffic generated to transport waste material offsite during the RA.

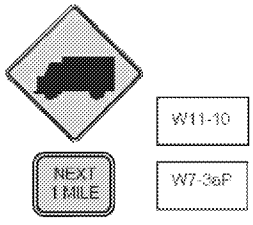
The potential impact to local communities will be further evaluated during the RD and based on the selection of a local disposal facility.

1.3 Traffic Management

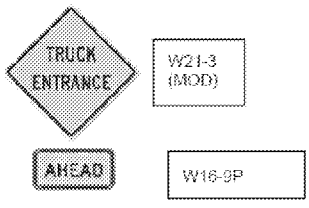
To inform local drivers of the potential presence of construction trucks, the Remediation Contractor will install traffic warning signs (e.g., truck entrance signs) on the left and right of each site entrance at U.S. Route 11 and 7th North Street.

If additional warning signs are warranted, the Remediation Contractor will place them in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition with Revision Numbers 1 and 2 incorporated, dated May 2012, and specifically Part 2 – Signs, Table 2C-2 and Part 6 – Temporary Traffic Control. The warning signs should be diamond-shaped (square with one diagonal vertical) standard 30-inch by 30-inch MUTCD warning signs with black legend and border on an orange background in accordance with MUTCD. Supplemental plaques consisting of 24-inch by 18-inch rectangular signs may be attached below the diamond shaped warning sign. Examples of sign configurations and MUTCD designations are shown below.

Warning Sign Configuration #1



Warning Sign Configuration #2



Alternately, portable signs warning of truck traffic may also be placed on the left and right of each site entrance at U.S. Route 11 and 7th North Street.

When construction vehicles travel over public roads, the Remediation Contractor will be required to follow the rules and regulations specific to hauling potentially hazardous material over public roadways. At a minimum, the removed material will be loaded into a lined truck with a sealed gate, which must not show signs of leaking, and would be transported using an appropriate Materials bill of lading (BOL). If the tires of the truck to be used for transport come into contact with the removal area, the tires will be cleaned Section 02 51 00, Decontamination (Appendix C to the Preliminary Remedial Design) before traveling to a public road. Tracking of onsite material to public roads is not permitted, and the Remediation Contractor will be required to have erosion control measures in place to prohibit such tracking. If tracking of material onto public roads is observed by the Remediation Engineer, the Remediation Contractor will promptly clean such paved surface and modify erosion control measures and best management practices as required to prevent further tracking. Additional details regarding traffic controls are presented in Specifications Section 01 55 00, Temporary Access Roads and Parking (Appendix C to the Preliminary Remedial Design).

Figures

Route:

1. If entering on US-11 (Phase 1), head south on US-11 and turn right onto 7th North Street; otherwise, enter on 7th North Street (Phase 2; either directly or via Terminal Road) and turn west.
2. Turn right to merge onto I-81 North toward I-90/ Watertown.
   - Continue north for destinations north; otherwise proceed to Step 3.
3. Take Exit 25A for I-90 West toward Buffalo (toll road) for destinations west.

Legend:
- Construction Entrance/Exit
- Proposed Offsite Route

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE

PRELIMINARY TRANSPORTATION AND NON-LOCAL DISPOSAL PLAN

PROPOSED ROUTE – WEST AND NORTH

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FIGURE D1

12/6/2021 9:41:29 AM

Route:

1. If entering on US-11 (Phase 1), head south on US-11 and turn right onto 7th North Street; otherwise, enter on 7th North Street (Phase 2; either directly or via Terminal Road) and turn west.
2. Turn right onto the I-81 South ramp to Syracuse for destinations south.

Legend:

- Construction Entrance/Exit
- Proposed Offsite Route

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE

PRELIMINARY TRANSPORTATION AND NON-LOCAL DISPOSAL PLAN

PROPOSED ROUTE – SOUTH

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FIGURE **D2**

12/6/2021 9:41:31 AM

Route:

1. If entering on US-11 (Phase 1), head south on US-11 and turn right onto 7th North Street; otherwise, enter on 7th North Street (Phase 2; either directly or via Terminal Road) and turn west.
2. Turn right to merge onto I-81 North toward I-90/ Watertown.
   - Continue north for destinations north; otherwise proceed to Step 3.
3. Take exit 25A for I-90 East toward Albany (toll road) for destinations east.

Legend:
- Construction Entrance/Exit
- Proposed Offsite Route

LOWER LEY CREEK
SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE

PRELIMINARY TRANSPORTATION AND NON-LOCAL DISPOSAL PLAN

PROPOSED ROUTE – EAST

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FIGURE D3

12/6/2021 9:41:31 AM

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Appendix E

Permits Equivalency Substantive Requirements Summary

Table E1
Permits Equivalency Substantive Requirements Summary
Lower Ley Creek Subsite Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina, Onondaga County, New York

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Agency / Stakeholder	Permit Equivalency	Applicable Activity	Appropriate or Relevant and Appropriate Requirements	How / Where Satisfied
United States Army Corps of Engineers (USACE)	Nationwide Permit No. 38 – Clean-up of Hazardous and Toxic Waste (NWP38)	Dredging and excavation of contaminated sediments and placement of fill and cap within Lower Ley Creek and adjacent wetland areas	• CWA Section 404(b): Title 33 of U.S.C. §1344(b); Title 40 of CFR Part 230 • CWA Section 404(c): 33 U.S.C. §1344(c); 40 CFR Part 231; 33 CFR Parts 320-329 • Section 10 of the River and Harbors Act: 33 U.S.C §403; 33 CFR Parts 320-322	➢ A wetland delineation and habitat characterization were performed during PDI activities to support development of appropriate restoration techniques during the RD process. ➢ Per Section 5.5 of the RD (Construction Monitoring and Environmental Controls), the following would be developed during the RD process and implemented during RA: water quality monitoring program; BMPs and engineering controls; and corrective action levels for water quality.
New York State Department of Environmental Conservation (NYSDEC)	Section 401 Water Quality Certification	Dredging and excavation of contaminated sediments and placement of fill and cap within Lower Ley Creek and adjacent wetland areas	• CWA Section 401: 33 U.S.C. §1341; Article 17, Titles 3 and 5 of the New York ECL; 6NYCRR Part 608, 700-706 • CWA: 33 U.S.C. §§1251-1387; 40 CFR §129.105(a)(4) • CWA: 33 U.S.C. §§1314(a); 63 CFR 68354	➢ Per Section 5.5 of the RD (Construction Monitoring and Environmental Controls), the following would be developed during the RD process and implemented during RA: water quality monitoring program; BMPs and engineering controls; and corrective action levels for water quality.

Table E1
Permits Equivalency Substantive Requirements Summary
Lower Ley Creek Subsite Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina, Onondaga County, New York

Agency / Stakeholder	Permit Equivalency	Applicable Activity	Appropriate or Relevant and Appropriate Requirements	How / Where Satisfied
NYSDEC	Protection of Waters Permit (Disturbance of the Bed or Banks; Excavation or Placement of Fill within a Navigable Water)	Dredging and excavation of contaminated sediments and placement of fill and cap within a portion of Lower Ley Creek, with classification B (portion of Lower Ley Creek with classification C would not be regulated under the Protection of Waters Program)	• NYS Protection of Waters Program: Article 15, Title 5 ECL; 6NYCRR Part 608	➢ A bank characterization was performed during PDI activities to support development of appropriate restoration techniques during the RD process. ➢ Per Section 5.5 of the RD (Construction Monitoring and Environmental Controls), the following would be developed during the RD process and implemented during RA: water quality monitoring program; BMPs and engineering controls; and corrective action levels for water quality.
NYSDEC	Freshwater Wetlands Permit	Dredging and excavation of contaminated sediments and placement of fill within adjacent wetland areas	• New York Freshwater Wetlands Act: Article 24 ECL; 6NYCRR Parts 662-665	➢ A wetland delineation and habitat characterization were performed during PDI activities to support development of appropriate restoration techniques during the RD process. ➢ A Habitat Restoration Plan is provided as part of the RD to restore impacted wetland areas.
New York State Office of General Services (NYSOGS)	Use of Underwater Lands Approval	Dredging and excavation of contaminated sediments and placement of fill and cap within Lower Ley Creek	• Public Lands Law: Chapter 46, Article 6, §75	➢ Consultation with NYSOGS will be completed during the RD process to confirm ownership of underwater lands.

Table E1
Permits Equivalency Substantive Requirements Summary
Lower Ley Creek Subsite Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina, Onondaga County, New York

Agency / Stakeholder	Permit Equivalency	Applicable Activity	Appropriate or Relevant and Appropriate Requirements	How / Where Satisfied
NYSDEC	State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-20-001)	Land disturbance of one acre or more from excavation of contaminated soils and placement of backfill and cap	• SPDES Permit Program: Article 17, Title 8 ECL; 6NYCRR Part 750 • CWA: 33 USC Part 1250 et seq.	➢ A plan for stormwater pollution prevention is incorporated into the RD and will be implemented during RA to control erosion and runoff during land disturbance.
Onondaga County Soil & Water Conservation District (SWCD)	Soil Erosion and Sediment Control Plan Approval	Land disturbance of one acre or more from excavation of contaminated soils and placement of backfill and cap	• NYS Standards and Specifications for Erosion and Sediment Control	➢ A plan for soil erosion and sediment control is incorporated into the RD and will be implemented during RA to control erosion and runoff during land disturbance.
NYSDEC	SPDES Individual Discharge to Surface Waters Permit (NY-2C)	Discharge of treated water decanted from dredging operations to surface waters (to be determined)	• SPDES Permit Program: Article 17, Title 8 ECL; 6NYCRR Part 750 • CWA: 33 U.S.C. Part 1250 et seq., 6NYCRR Parts 700-706 • CWA: 33 U.S.C. §§1251-1387; 40 CFR §129.105(a)(4) • CWA: 33 U.S.C. §§1314(a); 63 CFR 68354 • NYS Surface Water and Groundwater Quality Standards: Article 15, Title 3 ECL; Article 17, Title 3	➢ In the event discharge to surface waters would occur, decanted water from dredging operations will be treated to meet NYS effluent limits prior to discharge.

Table E1
Permits Equivalency Substantive Requirements Summary
Lower Ley Creek Subsite Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina, Onondaga County, New York

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Agency / Stakeholder	Permit Equivalency	Applicable Activity	Appropriate or Relevant and Appropriate Requirements	How / Where Satisfied
Publicly Owned Treatment Works (POTW)	POTW Approval	Discharge of treated water decanted from dredging operations to POTW (to be determined)	• POTW Discharge Requirements	➢ In the event discharge to POTW would occur, decanted water from dredging operations will be treated to meet POTW discharge requirements prior to discharge to system.
City of Syracuse and Onondaga County Planning Agency	Local Waterfront Revitalization Program (LWRP) Consistency Assessment	Dredging and excavation of contaminated sediments and placement of fill and cap within Lower Ley Creek (designated as a protected NY Inland Waterway)	• NYS Law: Executive Article 42; Sections 910-923	➢ The LWRP for Onondaga Lake, including a portion of Ley Creek, is currently being developed. Coordination with the City of Syracuse and Onondaga County Planning Agency on LWRP requirements will occur during the RD process.
U.S. Fish and Wildlife Service (USFWS) National Marine Fisheries Service (NMFS) New York Ecological Services Field Office	Section 7 Consultation	Dredging and excavation of contaminated sediments and placement of fill and cap within Lower Ley Creek and adjacent wetland areas	• Section 7 of the ESA: 16 U.S.C. §§1531-1544; 15 CFR Part 17, Subpart I; 50 C.F.R. Part 402 • Bald and Golden Eagle Protection Act: U.S.C. §668 • Migratory Bird Treaty Act: 16 U.S.C. §§703-712 • Fish and Wildlife Coordination Act: 16 U.S.C. §661, et seq.	➢ An official IPaC Project Review will be completed during the RD process to satisfy Section 7 ESA Consultation. ➢ The IPaC Resource List generated on February 18, 2021 indicated the potential for Indiana bat (*Myotis sodalis*; federal listed endangered species), and 16 bird species that may be located near the Subsite. Tree clearing requirements will be specified in the RD. ➢ Consultation with NMFS will be completed during the RD process to determine species that will be evaluated in an Essential Fish Habitat Assessment.

Table E1
Permits Equivalency Substantive Requirements Summary
Lower Ley Creek Subsite Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina, Onondaga County, New York

Agency / Stakeholder	Permit Equivalency	Applicable Activity	Appropriate or Relevant and Appropriate Requirements	How / Where Satisfied
NYSDEC	New York Natural Heritage Program (NHP) Consultation	Dredging and excavation of contaminated sediments and placement of fill and cap within Lower Ley Creek and adjacent wetland areas	• NYS Endangered Species Act: Article 11, Title 5 ECL; 6NYCRR Part 182 • NYS Protected Native Plants: Article 9, Title 16 ECL; 6NYCRR Part 193 • Fish and Wildlife Management Practices Cooperative Program: §11-0503 ECL	➢ Consultation with NYSDEC NHP will be completed during the RD process to determined state protected species within the vicinity of the Subsite.
New York State Historic Preservation Office (SHPO)	Section 106 Consultation	Dredging and excavation of contaminated sediments and placement of fill and cap within Lower Ley Creek and adjacent wetland areas	• Section 106 of the NHPA: 16 U.S.C. Section 470, et seq., 36 CFR Part 800 • NYS Historic Preservation Act: Article 14 of the Parks, Recreation, and Historic Preservation Law Part 426	➢ A Phase IA Cultural Resource Survey will be completed during the RD process and submitted to SHPO (through USEPA) for review. Additional consultation and requirements to satisfy Section 106 NHPA Consultation will be completed during the RD process as required.

Notes:

1. The following federal regulations and guidance may also be applicable to the activities associated with implementing the RA:
   - Statement of Procedures on Floodplain Management and Wetlands Protections (Executive Orders 11988 and 11990): 40 CFR Part 6, Appendix A
   - USEPA Office of Solid Waste and Emergency Response – Policy of Floodplains and Wetland Assessments for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Actions, August 1985: OSWER Directive No. 9280.0-2
   - Clean Air Act: 42 U.S.C. §§7401-7671q; 40 CFR Parts 50-52; National Ambient Air Quality Standards
   - Air Pollution Control Law: Article 19, Title 3 ECL; 42 U.S.C. §7401
   - Solid Waste Disposal Act – Standards for Owners and Operators of Hazardous Wastes, Treatment, and Storage Facilities: 40 CFR Parts 264-265
   - Toxic Control Substances Act: 15 U.S.C. §2605; 40 CFR Part 761
   - Hazardous Materials Transportation Law: 49 U.S.C. §§5101-5127; 49 CFR Part 171
   - Solid Waste Management Facilities: Article 27, Title 7 ECL; 6NYCRR Part 360
   - Standards for Waste Transportation: Article 27, Title 3 ECL; 6NYCRR Part 364
   - Identification and Listing of Hazardous Wastes: Article 27, Title 9 ECL; 6NYCRR Part 371
   - Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities: Article 3, Title 3 ECL; Article 27, Title 7 ECL; 6NYCRR Part 372
   - Hazardous Waste Treatment, Storage, and Disposal Facility Permitting Requirements: Article 3, Title 3 ECL; Article 27, Title 7 ECL; 6NYCRR Part 373
   - Land Disposal Restrictions: Article 27, Title 9 ECL; 6NYCRR Part 376
   - Occupational Safety and Health Administration Standards, 29 CFR 1910 and 1926
   - United States Department of Transportation, Transportation Requirements, 49 CFR.

Acronyms and Abbreviations:

6NYCRR = Title 6 the New York Codes, Rules, and Regulations
BMP = best management practice
CFR = Code of Federal Regulations
CWA = Clean Water Act
ECL = Environmental Conservation Law
ESA = Endangered Species Act
LWRP = Local Waterfront Revitalization Program
PDI = pre-design investigation
NMFS = National Marine Fisheries Service
NHP = New York Natural Heritage Program
NHPA = National Historic Preservation Act
NYS = New York State
NYSDEC = New York State Department of Environmental Conservation
NYSOGS = New York State Office of General Services
NWP38 = Nationwide Permit No. 38, Clean-up of Hazardous and Toxic Waste
POTW = Publicly Owned Treatment Works
RA = remedial activity(ies)
RD = remedial design
SHPO = New York State Historic Preservation Office
SPDES = State Pollutant Discharge Elimination System
SWCD = Onondaga County Soil & Water Conservation District
USACE = United States Army Corps of Engineers
U.S.C. = the United States Code
USEPA = United States Environmental Protection Agency
USFWS = U.S. Fish and Wildlife Service

Appendix F

Documentation of October 21, 2021 Field Reconnaissance

Documentation of October 21, 2021 Field Reconnaissance

Locations L-7 and SS-19/SB-19

Lower Ley Creek Subsite
Operable Unit 25 of the Onondaga Lake Superfund Site
City of Syracuse/Town of Salina
Onondaga County, New York

Summary Location L-7

- Coordinates fall on the side bank on North side of Ley Creek
- Heavy vegetation (i.e., cattails)
- Side bank is lined with ± 1 to 2-foot diameter rock
- Historical (1996) results:
  - 46 mg/kg (0 to 0.75 feet)

Location L-7

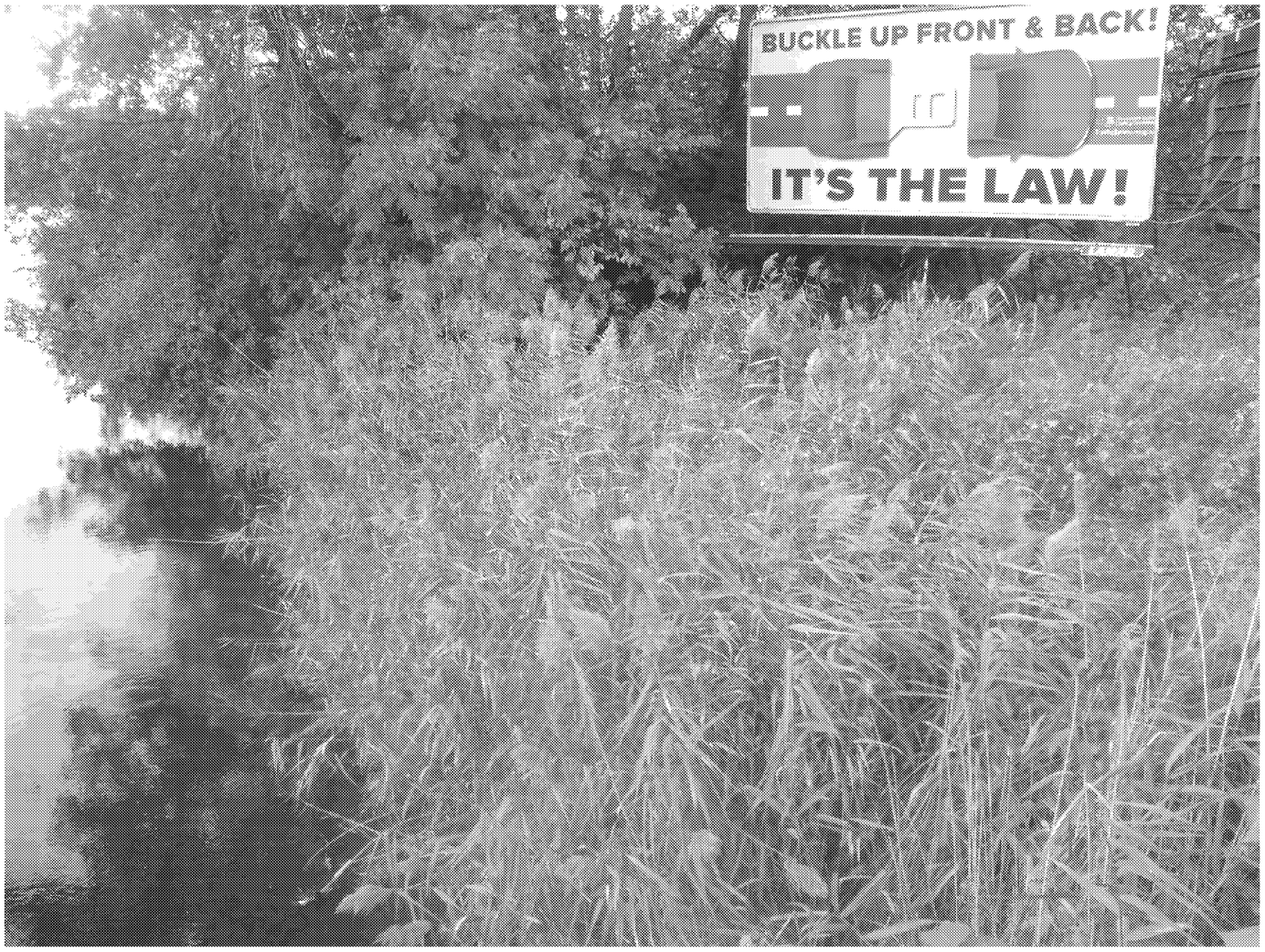
Looking east toward ground at location

Looking north across creek

Location L-7

Looking south toward creek

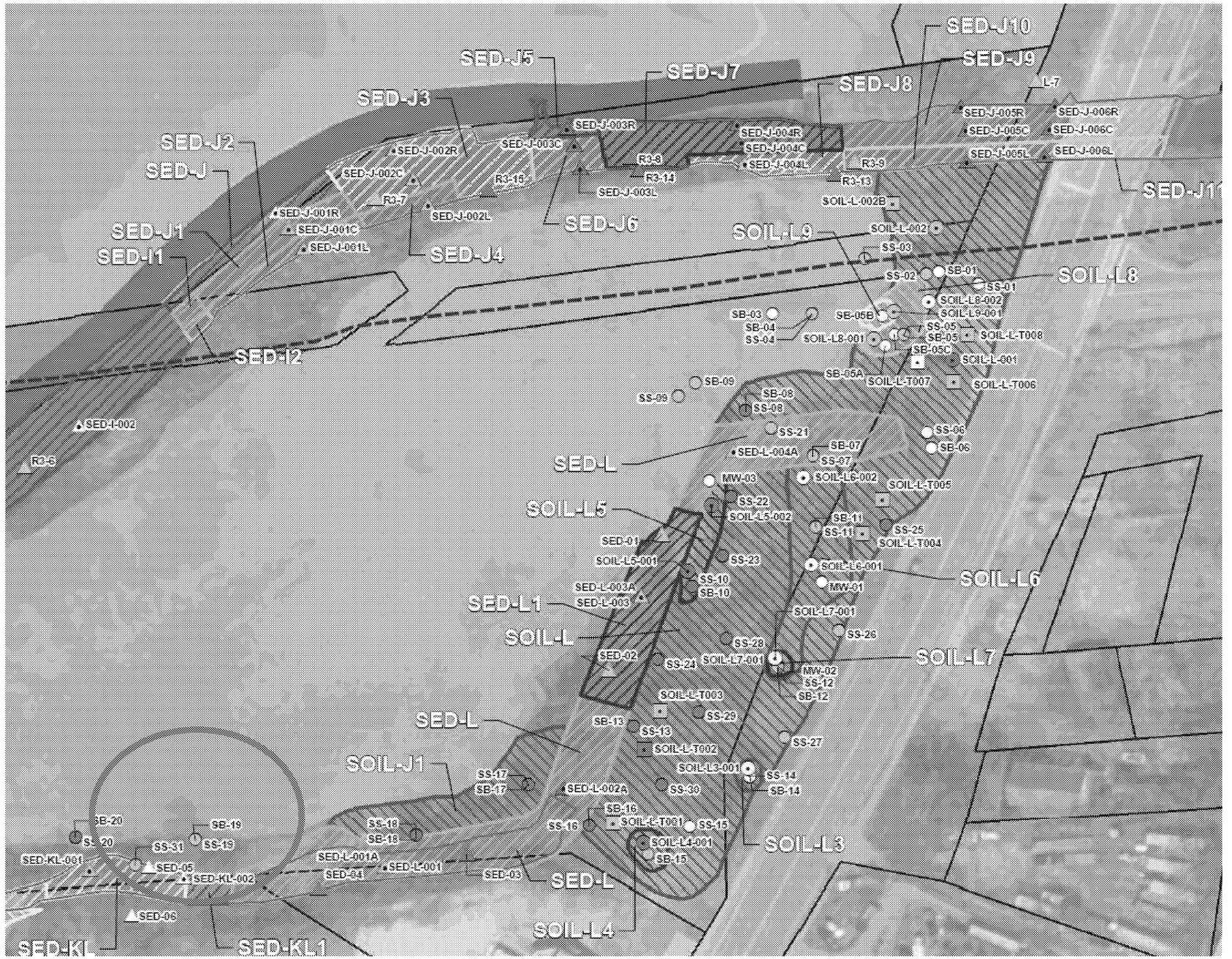
Location L-7



Looking west from bridge

Summary Location SS-19/SB-19

- Location ± 30 feet north of Old Ley Creek
- In previously cleared area at edge of tree line
- Light vegetation with cattails
- Historical (2010) results:
  - 34 mg/kg (0 to 0.5 feet)
  - 3.1 mg/kg (0.5 to 1 foot)
  - 0.17 (1 to 2 feet)
  - 5 mg/kg (0 to 4 feet)
  - 0 mg/kg (4 to 8 feet)
  - 0 mg/kg (8 to 12 feet)



Location SS-19/SB-19

Looking west at location

Location SS-19/SB-19

Looking east at location

Location SS-19/SB-19

Looking south toward creek

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